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THE UMAYYAD BATHS AT AMMAN CITADEL AND HAMMAM AL-SARAH ANALYSIS AND INTERPRETATION:

The social and political value of the Umayyad baths

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Résumé – Le but de cet article est double : tout d'abord présenter et analyser deux bains omeyyades en Jordanie, consolidés et restaurés sous la direction de l'auteur, qui illustrent des approches différentes dans leur plan et leur conception, selon leurs contextes urbains et suburbains respectifs ; ensuite, analyser leur valeur sociale, déduite de leur utilisation présumée, en fonction de leur environnement naturel et des contextes socio-culturels ainsi que de certains aspects techniques, et la façon dont ils ont été mis en service et utilisés.

Mots-clés – Architecture omeyyade, hammam, Jordanie

Abstract – The aim of this paper is two-folded: Firstly to present and review two relevant case-studies of Umayyad bath-houses from Jordan consolidated and restored under the direction of the author, which illustrate different approaches in design and conception according to their respective urban and suburban contexts; Secondly, to analyze their social and political value, elicited from the supposed use given to them, according to their natural environs and socio-cultural contexts, as well as some relevant technical aspects of the way they were put into service and used.

Keywords – Umayyad architecture, bath-house, Jordan

ملخّص – الهدف من هذه الورقة هو: الأول: تقديم ومراجعة نموذجين من الحمامات الأموية في الأردن تم ترميمها وصيانتها تحت اشراف المؤلف، والتي توضح الأساليب المختلفة في مفهوم وتصميم الحمام وفقاً للمحتويات الخاصة بالحضر أو الضواحي. الثاني: تحليل القيمة الاجتماعية التي تستخلص من الهدف الذي من أجله استخدمت هذه الحمامات وفقاً للبيئة الطبيعية والمحتويات الاجتماعية والثقافية التي تحيط بها، فضلاً عن بعض الجوانب الفنية ذات الصلة التي من أجلها استخدمت هذه المباني.

كلمات محورية – العمارة الأموية، الحمامات، الأردن، القيمة الاجتماعية والسياسية

The Umayyad bath at Amman Citadel

Location and access from the medina and the Palace

The most remarkable characteristic of this bath-house is its location within the palatine complex of Amman Citadel, serving both the Palace and the palatine medina built side by side atop Jabal Qalaʿa: The bath complex is located to the east of the Vestibule (or monumental gateway), outside the walled precinct of the Palace, in an intermediate position between the Palace and the medina. It is actually part of the complex arranged around the souq square that include the Vestibule, the congregational Mosque and the porticated souq itself, that define the core of the Umayyad layout of the Citadel (**fig. 1**). [1]

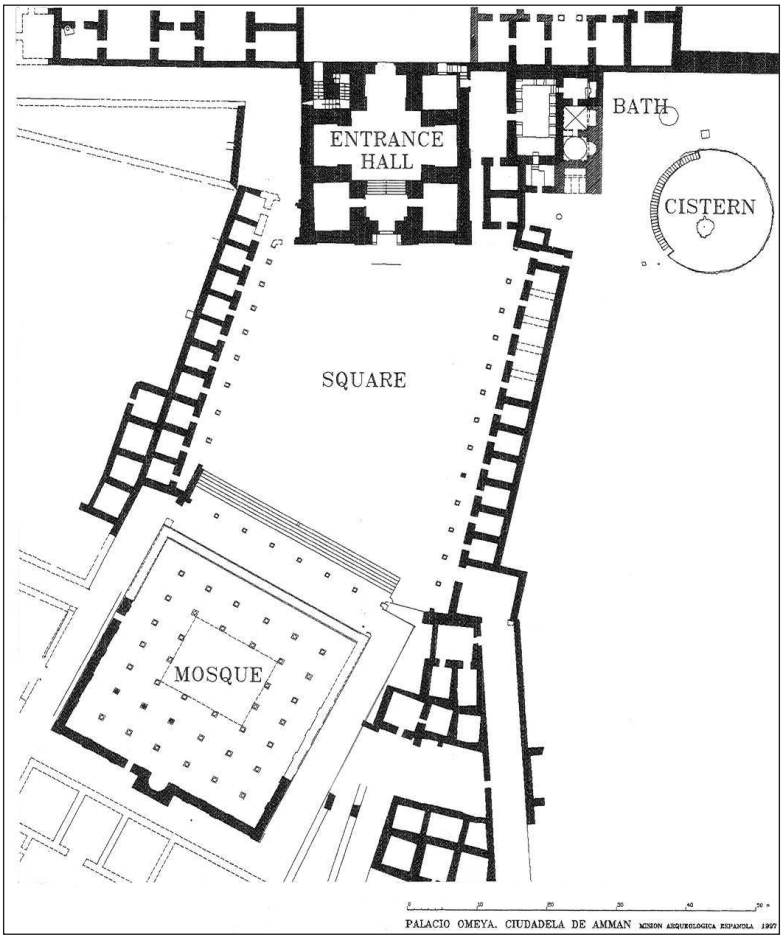

Figure 1. Amman Citadel. *Souq* square area. General plan with the porticated shops of the *souq* framing laterally the main building facing the square: The congregational mosque at the southern end and the Vestibule or monumental gateway to the palace at the northern one, flanked by the bath-house (hammam)
© I. Arce / Spanish Archaeological Mission.

1. The excavation of these structures has been carried out by the Spanish Archaeological Mission as part of the Excavation and Restoration projects of the Umayyad Complex at Amman Citadel and of the complex of Qasr al-Hallabat/Hammam al-Sarah. These projects, directed by the author, are funded by the Spanish Agency for International Cooperation and by the program for archaeological research abroad of the Spanish Ministry of Culture.

Access to the bath is provided by a court, 12.50 x 5.40 m in plan, between the Vestibule and the bath itself (**fig. 2, 3** and **4**). Access to this court from the *souq* square is achieved through a corridor 2 m wide and 10.25 m long. It is delimited by a door with a lintel and a relieving arch at the southern end and by a single arch on the northern end, from where it opens onto the entrance court. Between both arches a barrel vault once covered the passageway. [2] Beside this vaulted corridor and between it and the bath itself, there are two rooms. The first one is accessed from the *souq* square and could have been a shop of the *souq* or a guard room. The second one opens onto the court and was certainly related to the auxiliary services of the bath. Both rooms had slightly pointed barrel vaults with their axis perpendicular to that of the corridor, in order to counteract its lateral thrust.

Access from the interior of the Palace itself was gained through a stepped, narrow corridor located in the north-eastern corner of the Vestibule, running at an angle, with doors on both ends, which were closed from inside the corridor itself. In this corridor there is also a door which gives access to a high vaulted room, 5 x 5 m in plan that occupies most of the north-eastern section of the Vestibule (**fig. 2**). It was probably used as a guard room to control the access between the Palace and the bath court. It must be pointed out that apart from this entrance there is no access to the Palace except through the main gate of the monumental gateway or Vestibule. The service area opened onto an esplanade where was dug the open circular cistern (*birka*). This close location would indicate also a functional relationship, and one would expect that the water used in the bath came from this huge reservoir. Nevertheless, no traces of any water-lifting device have been found. Besides, the quality of the water stored in an open air reservoir like this one does not seem to be the most appropriate for a bath. [3] The water from nearby subterranean cisterns (cleaner and better protected from algae and bacterial growth) might have been used instead (**fig. 2** and **6**).

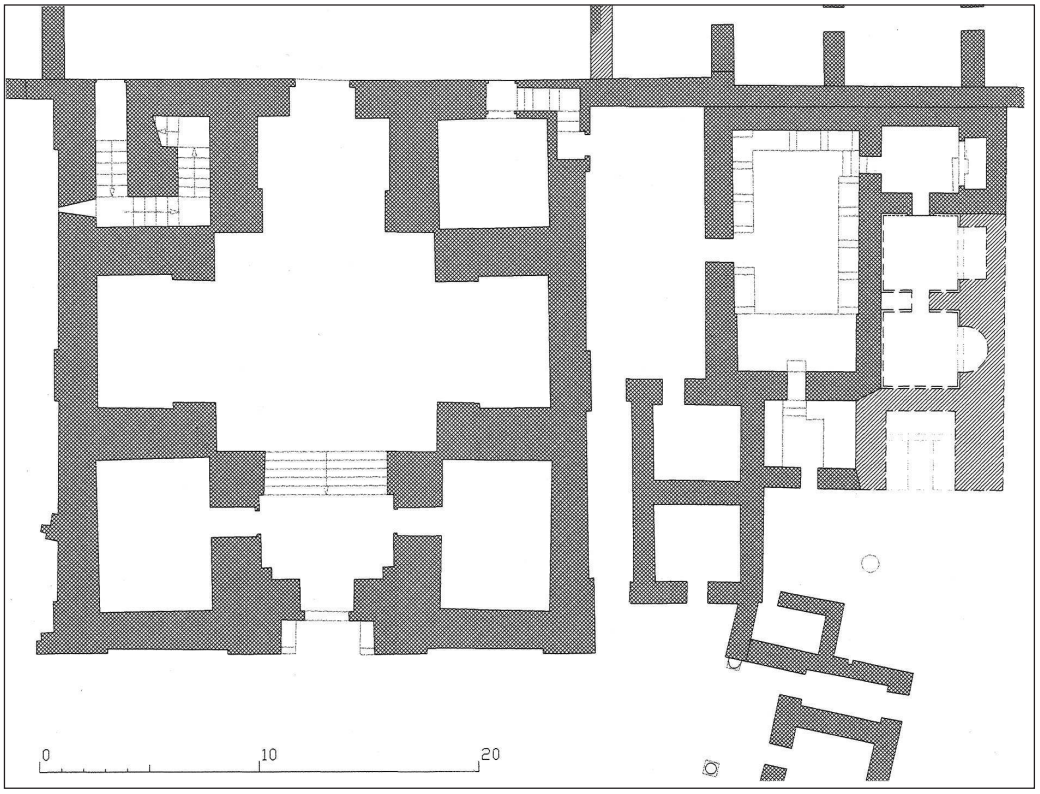

Figure 2. Amman Citadel. Plan of the hammam and the vestibule area
© I. Arce / Spanish Archaeological Mission.

2. The collapse of this vault also caused the ruin in the past of the section of the Vestibule façade that rested upon it.
3. For a detailed analysis of the bath complex within the whole hydraulic system of the Amman Citadel, see Arce 2004.

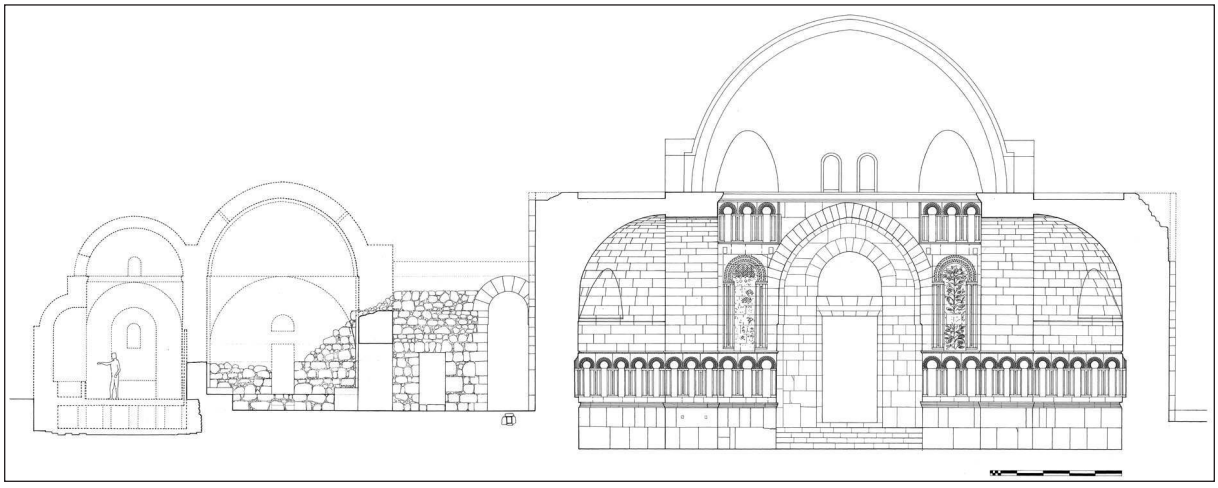

Figure 3. Amman Citadel. E-W Section of the hammam and the vestibule area © I. Arce.

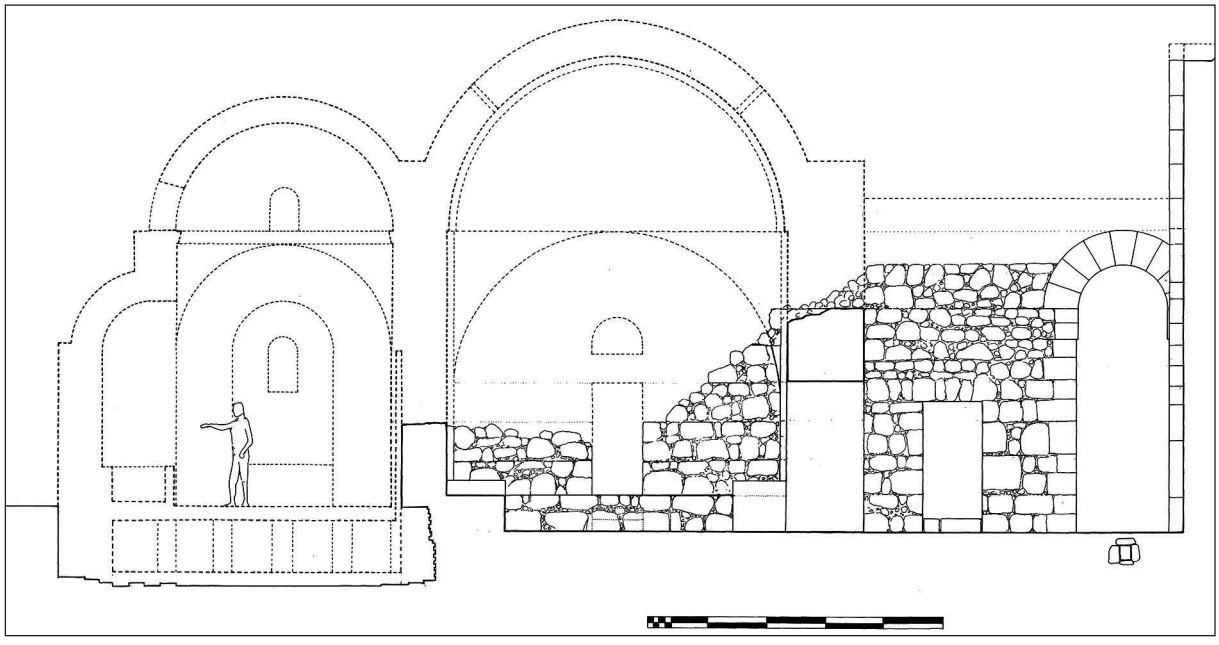

Figure 4. Amman Citadel. E-W Section of the hammam, across the *caldarium*, the audience hall and the access courtyard © I. Arce.

Discussion on the access scheme and the use of the bath

The specific position of the bath and its double access are certainly due to its use by the inhabitants of both the medina and the palace, acting as a true link between both areas, similarly to the adjoining monumental gateway or Vestibule. The use of the same bath by men and women on different days is not unusual even nowadays, but in this case is evident the common, although alternated, use of the same bath by princes and courtiers on the one hand and by common people on the other one. [4] We must take into account that one of the main singularities of the Palace at Amman Citadel is that it is not isolated, but linked to a "palatine medina", both on top of Jabal Qalaʿa. This fact explains the unusual

4. Grabar 1978 suggested also for the bath-house at Qasr al-Hayr al-Sharqi the possibility of a common use by courtiers and ordinary people. In our case the location and layout of the bath leave no doubt about it.

position of two important and common elements of a "standard" Umayyad Palace, which in this case are placed outside its walled precinct: The congregational Mosque and the bath itself. [5] This link with the "palatine city" might also explain the sharing of the bath, since the inhabitants of the medina on the Citadel were most probably not common people, but belonged to the elite of the new rulers. The actual "common" people, including the Christian population, would have lived in the town below, where there was another congregational mosque and most likely another bath. [6] We must not forget either the representative character of the bath in the Umayyad protocol. It is well known that certain areas of the Umayyad baths were used for representative purposes (Khirbat al Mafjar or Qusayr ʿAmra [7] are good examples), in addition to their hygienic and religious/ritual functions. Also in this case, despite the lack of a luxury decoration in its mosaic pavement (probably due to the mentioned shared use), the position of the benches and the stage covered by a half-dome inside the *apodyterium*, are indications of the use of this room as a proper audience hall.

The bath complex. General distribution and plan

Despite its poor state of preservation (due to the almost complete destruction of the brick-made *hypocaustum* and the structures above it), the building can be clearly described as a compact structure with two bays or rows of rooms placed in parallel. The first one (closer to the Vestibule) houses the *apodyterium* (also used as an audience hall) and an alcove or resting room. The second comprises the rooms devoted to the bath itself: the cold, warm, and hot rooms (the classical *frigidarium*, *tepidarium* and *caldarium*) and the furnace. Finally, there is a separate room (a latrine or service room) that also seems to be part of the complex. This plan is very similar to that of the Qasr Ain es-Sil bath, to the one at Qasr Mshash, located east of Muwaqqar in the *Badiya*, to the one at Al-Fudayn (in present day Mafraq) in northern Jordan, or to the one at Qasr Al-Hayr Al-Gharbi in Syria (see **fig. 23**, and the related discussion below). Their main common feature is their compact plan, of two bays enclosed in a rectangle (certainly different from the more articulated plans of those at Qusayr ʿAmra and Hammam al-Sarah that represent a different architectural and functional type). A characteristic feature is the survival of a proper *frigidarium* with its own cold water bathtub, following the traditional Roman scheme.

The apodyterium

A door provides access to this room from the court, without any change in the level of the pavement. The room is 10.95 m long and 5.90 m wide (5.70 m wide at the south end). This narrower area corresponds to the "stage" or platform that is 60 cm above the floor level of the room. Traces of plaster indicate that probably one or two narrow steps led to this raised platform. In the southwest corner is still seen the springer of one of the two pendentives that supported the half dome that certainly covered this raised platform (**fig. 4** and **5**). Alongside the walls of the room is located a 1 m (on average) wide bench (*kline*) with several armrests that divide it into sections. The floor of the room is made of large plain-white *tesserae* mosaic, while the floor of the stage and the benches are covered with plaster. Badly weathered fragments of carved stucco founded in the premises suggest that the walls were covered with this kind of decoration. One door in the south wall leads to a small room (a restroom?) connected with the open area for servicing the furnace and the latrine. Another door at the north end of the east wall of the *apodyterium* provides access to the cold room.

5. See Arce 2009c.
6. We have nonetheless evidence of the existence of a "Christian neighborhood" at the Citadel in Umayyad period around the East Street (see Arce 2009c).
7. Hamilton 1959, Almagro 1975.

Figure 5. Amman Citadel. Hammam. Left: *apodyterium*/audience hall looking East, with the *frigidarium* in the background (notice the Abbasid period latrine built piling some re-used bricks, which was used with a chamber-pot); right above: *apodyterium*/audience hall looking South, with the stage in the background; right below: *frigidarium*. Note the door leading to the *tepidarium* blocked in Abbasid period, to the right of the image © I. Arce.

The alcove or rest room

Located south of the *apodyterium* is a small room 3 x 4.15 m in plan. Its floor level is approximately the same as the *apodyterium*. It is equipped with benches (approx. 50 cm high) along three of its sides. The benches on the north and east sides are 80 cm wide, whereas the one on the west side is 1.40 m wide. These benches would indicate the room's use as a resting area, similar to the ones found in other Umayyad baths. This room has two doors: The first (80 cm wide) is connected with the *apodyterium* by means of five steps that span the difference in level between the alcove floor and that of the stage in the *apodyterium*. The second door in the south wall of the alcove provides access to the open area next to the furnace. The existence of this second door in a resting room, opening onto a service area is quite odd. The only logical explanation is that it could have led to a latrine that might have been in the service room related to the furnace and described below (or that it might have been used as a latrine: not having the proper hydraulic infrastructures, i.e: sewage drains, it might have been served by chamber pots, as in other areas of the palace, [8] or in the bath itself in Abbasid period —see below).

*The cold room (*frigidarium*)*

Access from the *apodyterium* to this room is gained through a four stepped door. This change in floor level is certainly due to the height of the *hypocaustum* or hot chamber, which is below the next

8. With the exception of the latrine found at the throne hall, all the latrines in the Palace were secluded rooms served with chamber pots (see Arce forthcoming and Arce 2004).

two rooms in this row (the *caldaria* or warm and hot rooms). Since this room is functionally linked with them, it is logical that the change in level occurs at its entrance. The room itself is 3 x 3.50 m in plan, with a niche in the east wall where a bathtub is located (**fig. 5**). This niche is 2.30 m wide and 1.25 m deep. The tub can be entered by means of plastered steps in brickwork. The floor and the walls of the room and the bathtub as well are covered with an impervious plaster, similar to the one found in the nearby open cistern (*birka*) and the sewage channels. This plaster has the slope required to drive the water through the drains opening in the floor and the bathtub. These drains lead to a channel that carries the used water to a decantation basin, 2.75 m in diameter and 1 m deep, near the *birka*. The water, once decanted, was probably disposed of into this large water deposit or reused elsewhere (**fig. 2, 6** and **8**).

Figure 6. Amman Citadel. Hammam. Above: General view towards E with the open cistern (*birka*) in the background (before restoration); below: Views of the *hypocaustum* area showing the brick-built areas looted (some of them correspond to the lower sections of the walls, which explain their collapse) © I. Arce.

The caldaria*: The warm (*tepidarium*) and hot (*caldarium*) rooms*

These two rooms were built over the *hypocaustum* that was heated by means of the hot air coming from the furnace nearby, located at the southernmost end of a straight axis along which the *caldarium* and the *tepidarium* were placed. The pavement (*suspensurae*) above was built apparently upon brick supports (*pilae*). The bricks are on average 28/29 cm square and 6-7 cm thick. Unfortunately most of the bricks from this area were looted in the past, causing the ruin of the perimeter walls of these rooms. Their collapse was due to the fact that these perimetral walls were founded on the brick infrastructure itself (**fig. 4** and **6**). Once the infrastructure bricks were removed, the walls above no longer had support. [9] The few traces of bricks and their imprints in the mortar basement allow suggesting only a hypothetical idea of their plan (**fig. 2** and **6**) and precise dimensions. We must imagine these rooms as two square spaces connected on an axis by aligned doors, and probably with bathtubs built into the thick east wall, i.e. very similar to the *frigidarium* described above (see plan). The projecting door jambs connecting the *frigidarium* and the *tepidarium* with the interior of this last room indicate the existence of a hot-air chamber in the walls of these rooms. The facing wall of this heated chamber might have been lined with ceramic *tubuli* (box flues), although the reduced dimension of the door projections indicates that these *tubuli* should have been very shallow. Alternatively we can hypothesize the use for this purpose of the marble slabs intended as final lining, [10] combined with *tegulae mammatae*. This chamber was used to facilitate the flow of hot air from the *hypocaustum*, heating the inner wall, hindering water condensation on its surface, and providing comfort to the user.

Furnace

The heat produced in the furnace was used both to warm the floor and walls of the *caldaria*, and the water used in the bath as well. This was achieved by placing a water container or basin over the furnace, while the *praefurnium* (or mouth that connects the furnace with the *hypocaustum*), built with a sloping pavement, facilitated the flow of hot air into the *hypocaustum*. The abundance of ashes in the area indicates that the furnace (and consequently the bath) was in use for a long but undetermined period of time. A separate room nearby the open area possibly accommodated the person responsible for the maintenance and feeding of the furnace (*fornaciarius*), or it was a latrine.

Vaulting system of the bath complex

Taking the section of the walls of the bath and the estimated or actual dimensions of the rooms into account, it seems that the same usual vaulting system of coeval and similar Umayyad baths was followed. The *apodyterium* was probably covered with a barrel vault on a north-south axis, with a half dome resting on pendentives at its south end, the springers of which are still seen *in situ*. This feature indicates and strengthens the representative value of the stage below it. The *frigidarium* was certainly covered by a barrel vault, with an east-west axis; while the *tepidarium*, according to the aforementioned examples, was probably covered with a crossed vault and the *caldarium* by a small dome (see plan in **fig. 2** and the hypothetical reconstruction in **fig. 7**).

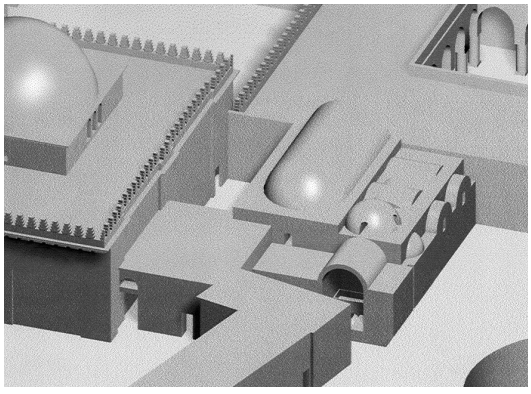

Figure 7. Amman Citadel. Hammam
© I. Arce, J. A. Fernández.

9. As can be seen in the picture, after looting the bricks the space left was filled with debris. This fact led the first excavators (Taysir Attiyat from the Department of Antiquities — afterwards, the excavation was resumed by the Spanish Archaeological Mission) to misinterpret these walls as late structures not belonging to the Umayyad complex.
10. Many small fragments of marble slabs found in the debris indicate that it was used in the lining of the *caldaria*.

The fate of the bath after the AD 748-9 earthquake

The bath continued operating during the Abbasid period, although it underwent a drastic transformation as the *hypocaustum* was dismantled and its bricks sacked and reused for the construction of kilns. [11] Nevertheless the *apodyterium* and the *frigidarium* were kept in use (including its bathtub) during the Abbasid period. This can be ascertained from the accurate blocking of the door connecting the *frigidarium* and the *tepidarium* (**fig. 5**). In the *apodyterium* a latrine was built by means of two rows of bricks that acted as a platform for the feet, with a space in between where a chamber pot can be placed (**fig. 5**). This would indicate that the vaults of these two rooms withstood the impact of the quake, while the *caldaria* and the furnace were out of use, their bricks being looted from that moment onwards.

The restoration of the complex

The serious damages suffered by the bath in the aftermath of the AD 748-9 earthquake, due to the mentioned looting of the *hypocaustum* bricks, meant the physical disappearance of all the areas above it. It was just possible to stop the decay and eventual destruction of the adjoining areas that remain still standing, by providing a founding base to these walls, the foundations of which had been looted. For this purpose replica bricks were made and used, filling the space of the former *hypocaustum* with sand and setting on its surface (with the same bricks) the approximate layout of the destroyed rooms. The nearby open circular cistern (*birka*), and the systems of channels, part of the same complex, were consolidated and restored as well, [12] the former regaining its cylindrical profile and its spiral flight of steps (**fig. 8**).

Figure 8. Amman Citadel. The open cistern (*birka*) after restoration
© I. Arce.

11. See ARCE 2003b.
12. The whole systems of channels feeding the cisterns and the open cistern (*birka*) were restored as well, regaining its original function, allowing thus the collection of water for maintenance services, and preventing the creation of puddles and mud in the winter rainy days. For more detailed information about the intervention and the technical context of the whole Umayyad Hydraulic system at the Citadel see ARCE 2004.

Hammam al-Sarah

Location and general description of the complex

Hammam al-Sarah [13] is located 56 km to the northeast of Amman, and is related to the Umayyad palatine complex of Qasr al-Hallabat, standing three and a half km further West. [14] It is composed of several elements: the bath-house itself with the adjoining audience hall, the hydraulic infrastructure and the walled garden (**fig. 9**). A mosque was attached in later date to the service rooms of the bath-house in its northernmost end, while some houses, not documented up to now, lay close to the asphalt road more to the North. The date of these additions is still controversial (due to insufficient material evidences), although the mosque is clearly post-Umayyad.

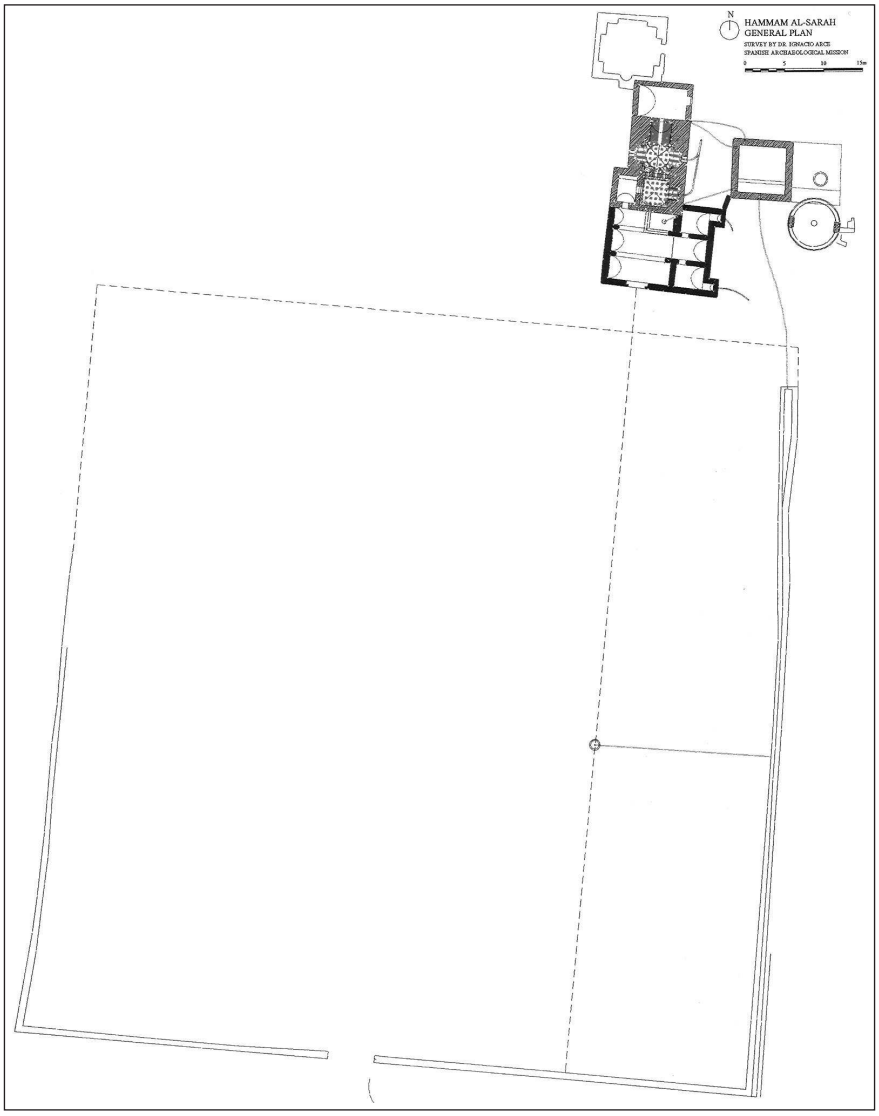

Figure 9. Hammam al-Sarah. General plan of the complex, with the bath-house, the hydraulic complex and the enclosed garden © I. Arce.

13. The project for the excavation and restoration of these structures (and the nearby Qasr and Mosque at Hallabat), is funded by the Spanish Agency for International Cooperation, and directed by the author. The Spanish Ministry of Culture provides further funds for complementary research activities.
14. For descriptions of the complex see Creswell 1979 p. 498-502; Bisheh 1989.

The building was first discovered by Butler in 1905 and later described, photographed and surveyed by Creswell in 1926. [15] It was well preserved until the decade of 1950's (**fig. 10**), but it has been heavily damaged since then due to a massive process of looting that destroyed it almost completely (**fig. 11**). Excavation and restoration undertaken by the Department of Antiquities in 1974-1975 prevented its complete ruin, although some of the elements were not successfully restored (due to the lack of proper technical supervision), [16] obscuring and altering in some points the proportions and the structure of the building, especially in the vaults rebuilt at the *tepidarium* (**fig. 15**) plus the *caldarium* dome (**fig. 12**). Recently a thorough intervention in the complex and the building itself has been undertaken by request of the Department of Antiquities, as part of the excavation and restoration project of the Hallabat complex directed by the author. The aim is to dismantle the emergency reconstructions built in 1974 (that encased the original remains with a newly built stone facing, using a stiff cement-based mortar), trying to consolidate the structure, regaining the original proportions and a mechanical balance between the original remains and the newly rebuilt elements, to guarantee its structural equilibrium. Accordingly, a more elastic lime-based mortar is being used. It will allow the old and new sections of the building to behave as a whole, preventing differential movements, and guaranteeing thus its preservation. The analysis and the de-restoration process carried out provided an in-depth view of the complex that allow a better understanding of how it was built and used, and that ultimately would permit us to carry out a proper restoration of the remains left. [17]

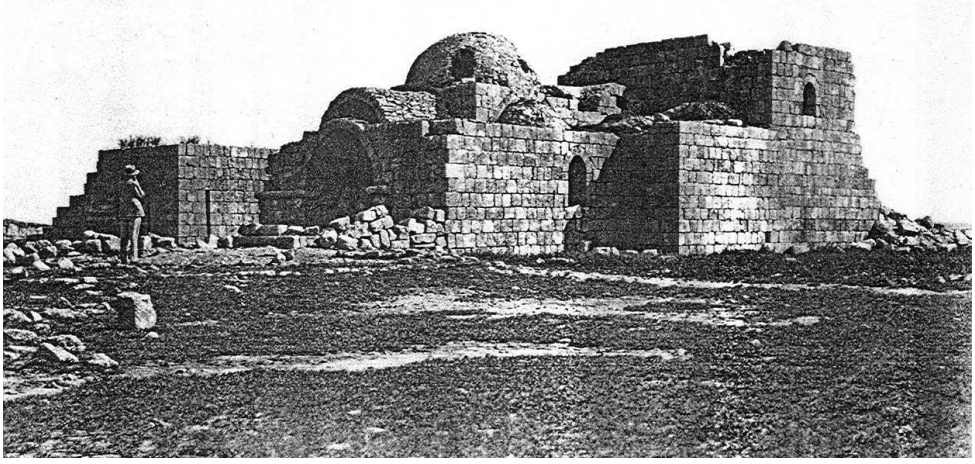

Figure 10. Hammam al-Sarah. View of the building in the 1950's.

15. The pictures from the Creswell Archive at the Ashmolean Museum in Oxford have been a valuable source of information, as well as those from the Documentation Center of the Jordanian Department of Antiquities and those provided by Ghazi Bisheh himself. I seize the opportunity to thank Drs. Teresa Fitzherbert and Katherina Hamarneh, curators respectively of these archives, as well as Gh. Bisheh and the DoA's General Directors, Fawwaz Khreyshah and Monther al-Jamhawi for their kind help and collaboration.
16. See Bisheh 1989, p. 225.
17. This is an ongoing project the results and conclusions of which will be reviewed in the next future when the intervention will be finished. I express my gratitude and recognition to my assistants Mohammad Nasser and Ghassan Ramahi and to the whole team, for their commitment and support.

Figure 11. Hammam al-Sarah. View of the building in 1974 before the DoA intervention © DoA Archive.

Figure 12. Hammam al-Sarah. Internal view of the building after the restoration. Note the reconstruction of the dome, and the northern arm of the *tepidarium*'s cross vault, erroneously elongated in the 1974 restoration till the southern arch of the dome's pendentives. This area was originally occupied by the "venturi suction chamber", opened to the sky © I. Arce.

The bath-house building

As pointed by previous researchers, the structure of the bath-house at Hammam al-Sarah is strikingly similar to that of Qusayr ʿAmra in plan, [18] although the building technique, with well dressed and squared middle size stone masonry, is better than at ʿAmra [19] (built with coursed un-squared stones and massive chipping in the jointing). Other significant differences regarding technical issues will be the scope of some further analysis. The two main sections of the building are the so-called audience hall [20] (actually a structure that also integrates an alcove and the restrooms) and the proper bathing-rooms, arranged in a compact angular scheme (**fig. 13**). Material evidences support the hypothesis that these two sections of the bath-house were built one after the other. The changes that can be noticed in the building techniques used in the respective sections would not only prove this, but would also indicate a certain lapse of time between both building activities. [21]

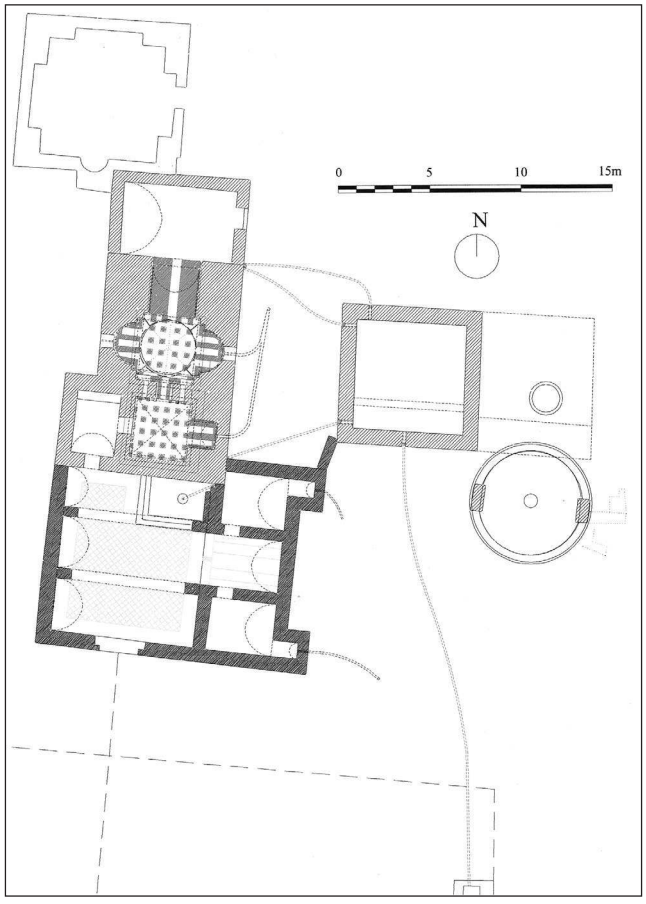

Figure 13. Hammam al-Sarah. Detailed plan of the building, the hydraulic system, and the late mosque
© I. Arce, Spanish Archaeological Mission.

18. The recently identified Umayyad bath-house at al-Qastal, of which just part of its plan has been uncovered, would present some similarities with al-Sarah and ʿAmra in the arrangement of some of the rooms, specially the apsed alcove flanked by two lateral rooms and opened to the hall (Bisheh 2000).
19. Ironically, this better quality has meant its ruin by looting, to re-use its squared stones.
20. This space would recall the so-called thermal basilicas that were built in some Late Antique bath-houses, like those at Sepphoris and Andarin (see below). They served to articulate the circulation giving access on the one hand to the restrooms and on the other to the bath itself.
21. The section with the bathing rooms was built first, probably to respond to the basic hygienic needs, while the hall and the restrooms were added later.

The audience hall

The so-called *audience hall* [22] consists of a main rectangular room (7.82 x 9.1 m in plan) covered by three barrel vaults resting on two diaphragm arches spanning E-W and the extreme northern and southern walls of the room, [23] plus an alcove with flanking resting rooms provided with latrines. The diaphragm arches (6.3 m of span and slightly pointed) spring from two low piers topped with quarter-round brackets. Surprisingly, neither the piers nor the arches were built engaged in the perimeter walls, but abutting against them, being probably built immediately after the perimeter wall of the room. [24] The central and southern vaults are very similar, spanning a distance of 2.88 m and 2.85 m respectively, while the northernmost vault spans a distance of just 2.2 m. A quarter-round molding was running over the crown of the diaphragm arches and all around the perimeter walls, marking the impost line of the vaults (very similar to the nearby Mosque of Qasr al-Hallabat). On top of it, two courses of well dressed limestone voussoirs can be seen in Creswell photos (#EA_CA_5401). We do not know if its three barrel vaults were built with squared masonry (as the ones from the central alcove and the lateral rooms), or if they were built with limestone thin slabs in a brickwork fashion (like in the bath-rooms), or even with a lightweight concrete made of lime mortar and volcanic tuff (as in the nearby and coeval barrel vaults from Hallabat Mosque). The mechanical and constructional similarities between al-Sarah and Hallabat Mosque, with identical springing design (three barrel vaults resting on parallel diaphragm arches in both cases), lead us to consider the latest solution as the most likely, as it is the lightest one and consequently the most secure. The room was illuminated by three arched windows located in the upper section of the western wall, under the crown of these three barrel vaults.

In the eastern corner of the room was located a small sunken fountain-pool (Ar: *fisqiya*) measuring 2.9 x 2.05 m in plan with two lines of steps surrounding its southern and western sides, [25] lined and paved with marble slabs. It has a central cylindrical pier consisting of two superimposed split drums with a hollow core that fed the fountain by means of a clay pipe coming from the elevated water tank (another pipe located in the SW corner drained the pool outwards). Bisheh reports traces of four lead-filled holes on the upper drum indicating that a basin was probably placed on top of it. The traces of marble statues found [26] in the pool itself might have been part of this decorative fountain. [27] On the northern wall just above the pool still can be seen traces of a (now illegible) inscription in red paint. The fact that it would have been covered by the marble panelling of the pool (as the holes piercing the wall to host the supporting cramps demonstrate), makes out of it an odd feature, that would find explanation in an hypothetical construction of the building in two stages (see below).

On its eastern wall, between the two diaphragm arches, a vaulted alcove (2.85 m wide by 4.25 m deep), opens to the main hall through an arch. Similarly to the case of Qusayr ʿAmra, this recess would have been the focal point for the audiences that could have taken place inside this room. Its vault was built with finely dressed stone masonry, springing from a moldered cornice. This alcove is flanked by two rest rooms, also vaulted (2.9 m wide by 3.5 m long) that are entered through doors with stilted

22. Bisheh 1989, p. 225, calls this room "audience hall", on the basis of its hypothetical use. To avoid confusion in the discussion we use this term as well.
23. For a detailed discussion about the building techniques, see Arce 2003a, Arce 2006 et Arce 2007a.
24. This can be still seen nowadays at the piers' level, while in the historical pictures from Creswell Archive (photo #EA_CA_663) can be seen how this fact occurs also in the upper section of the arches.
25. The wall flanking the eastern side of the pool was built, doubling the masonry wall of the room, with thin pieces of roughly hewn limestone (similar technique to that from the vaults and dome of the bathing rooms), while on the northern one (built with ashlars) was found the red painted inscription, later obscured by the marble lining of this section of the wall.
26. Bisheh 1989, p. 227 & pl. 63a-d.
27. This fountain pool could have played the role of the cold water plunge placed in the *frigidarium* of the traditional Roman baths.

relieving arches [28] (now disappeared, but still seen in Creswell photographs #EA_CA_663 & 5401). Each of them was illuminated by three narrow rectangular windows, two in the lateral walls and one in the back one. At the back of these lateral rooms, in the outer corners, there are two rectangular recesses (0.90 m wide by 1.40 m deep) projecting outwards the eastern façade, and covered also by small barrel vaults, that were used as latrines. The barrel vaults from the alcove, the rest rooms and the latrines were built with well dressed voussoirs, as can also be seen in the historical images from the Creswell Archive (photographs #EA_CA_5401 & 5402).

Although one would have expected to find the entrance to this main hall in the western wall, i.e. in front of the alcove (as it occurs at Qusayr ʿAmra), the door is unexpectedly in the center of the southern side. This unusual arrangement that forces the visitor to turn right sharply to face the alcove, finds a logical explanation when the whole complex is taken into account: The location of the door is determined by the arrangement of the walled garden and its fountain, axially aligned with the door. Unlike Qusayr ʿAmra where the internal alcove (the so-called "throne alcove") [29] determined the location of the door, at H. al-Sarah the external garden fixed the position of the entrance.

The jambs of this door were decorated with an unusual system of alternating concave and convex mouldings, similar to those found at Hallabat mosque, [30] and at the porch of the bath of Khirbat al-Mafjar. At Sarah the decorative patterns reached a level of complexity not found in the previous cases. The lintel was a superb reused Roman element decorated with a *tabula ansata* and two knotted wreaths (found broken and now restored).

Linings and pavements

The pavement of the main hall was composed of a frame of marble slabs defined by the bands between each pair of opposed piers as well as the perimeter of the room and the edges of the pool, while the rectangular sections in between were paved with square stone tiles (24 x 24 cm) placed diagonally and with alternated whitish and pinkish colour. We can elicit this scheme from the imprints left in the mortar bedding and from some remains still found *in situ*. The alcove entrance had a stone threshold (51 cm wide); two lateral square depressions in its ends beside the lateral walls indicate that two pilasters flanked the entrance, [31] while a central channel (*misrab*) drained its floor towards the main room. The rest of the alcove would have been also paved with marble slabs, as five longitudinal bands can be identified in the mortar bedding. The lateral rooms had mosaic floors with a pattern of diagonally placed squares (some traces still survive in the northern one). The latrines' floors were 20 cm higher than the mosaic ones of the lateral rooms, and were paved with marble slabs with a central hole. G. Bisheh [32] reports that the surface drainage from the lateral rooms was driven into the latrines through pipes (7 cm diameter) which run under the recesses so as to use the waste water from the lateral rooms to flush them. Unfortunately they have all gone now.

28. Similar kind of relieving arch is found at Qasr al-Hallabat (corresponding to the pre-Umayyad phase) and at its Umayyad Mosque, as well as in the Umayyad structures at Amman, Harrane and Qastal. I support a Yemenite origin for this singular architectural element (alien to the Syrian tradition before the second half of the 6th cent. AD). The influence of South-Arabic building tradition on the Levant in Late Antiquity is the focus of a forthcoming paper by the author.
29. This name is derived from the depiction on its back wall of the Caliph seated on a throne and under a *fastigium* (see Almagro 1975). Accordingly, it was assumed that this was the place where a throne (if any) would have been placed to preside the audiences offered in this hall.
30. The restoration of the Hallabat Mosque (also directed by the author) has confirmed the close relationship in terms of building techniques, spatial conception, and singular decorative motifs, between these three structures. This would point to the common authorship of the same architect for the three buildings (or to be more precise, to the later additions and transformations carried out in these structures).
31. These could correspond to a screen to seclude the alcove, or even could have been an alternative location for the marble statues found among the rubble in the nearby pool.
32. Bisheh 1989, p. 228.

Stucco mouldings

The scarcity of the stucco remains found during the excavations carried out by the Department of Antiquities [33] and the fact that most of the walls were built with finely dressed stone-masonry, and decorated with carved mouldings, would indicate that this decoration was used mainly to frame doors and windows (some of the fragments retrieved correspond to arched elements). Traces of stucco framings for glass *civas* and fragments of flat colored glass found recently would indicate that the windows were closed with glass to facilitate the control of the rooms' temperature.

The proper bath-house rooms

The rooms corresponding to the proper bath-house are grouped in an angular setting, being the two heated rooms (*caldaria*) and their respective *hypocausta* aligned with the *praefurnium* (furnace; Ar: *furun*), while a room without *hypocaustum* is placed laterally to the second of the heated rooms in a quite compact prismatic block. These three rooms have been usually interpreted and named according to a traditional and basic scheme as "*caldarium*", "*tepidarium*" and "*frigidarium*", with some discrepancies regarding the last one. [34] The fact that the cold water tub [35] disappears from this last room and benches are added to it, would indicate a different scheme of use: This latter room would have been used as a changing (cloak), tempering and waiting room before gaining access to the warm rooms, while the body got used to the hot temperatures. In this sense it could be described functionally as a transition or waiting room before entering the two *caldaria* (it would be warmed indirectly thanks to the heat coming from the latter [36]). The *caldaria* (*caldarium* and *tepidarium*) could be functionally described respectively as a *sudatorium* and a *destrictarium*.

The disappearance of the "*frigidarium*" as understood in a traditional Roman bath, plus the location in the main hall [37] of the cold water bathtub (transformed into a decorative fountain pond), is a very relevant fact as the result recalls the Late Antique baths of Syria, and would demonstrate their influence in the transformations that will lead to the medieval hammam. Furthermore, this change would be consistent with the hypothesis put forward by G. Charpentier: [38] He suggests that new technical changes would have been developed from the Late Antiquity onwards in the Levant, introducing a mixed humid/dry heating system. It would combine the traditional "dry heat" generated by the Roman-origin *hypocausta,* with the "humid heat" created by means of the injection of hot vapour. This vapour would be generated in a basin above the furnace and would be introduced in this *caldarium*/*sudatorium* through an opening at the top of the wall that separates it from the nearby furnace (it can still be seen at Qusayr ʿAmra). This would be thus the first step for the creation of the proper medieval hammam, conceived as a bath with humid heat. This technical sophistication is also coherent with other technical innovations introduced at Hammam al-Sarah that will be discussed later: For instance, the semi-circular bathtub recesses from the *caldarium* and the rectangular one from the *tepidarium* do not project outwards (like at Qusayr ʿAmra [39]) but are comprised in a prismatic and compact block of masonry, on top of which raise the extrados of the vaults and the dome. This solution prevents losses of heat and makes the building more thermal-efficient.

33. Bisheh 1989, pl. 61-2.
34. Bisheh, according to their apparent use, calls them quite appropriately, "*caldarium*", "*tepidarium*" and "*apodyterium*" (Bisheh 1989, p. 228-229).
35. The bath tub is replaced with a pond, with a decorative added value, and incorporated into the *apodyterium* itself, that can be used as we have seen, as an audience hall (something that justify this decorative value).
36. According to the temperature shift we could describe this room as a sort of "*tepidarium*", while if we take into account just its use as changing room we should follow Bisheh and call it "*apodyterium*". In order to avoid confusion, we will use the term *transition or changing room*.
37. Equivalent to the Late Antique thermal basilicas, which also incorporate cold water tubs.
38. Charpentier 1995, p. 231-233.
39. We assume ʿAmra is earlier than Sarrah, a sort of intermediate prototype, following Late Antique models. Sarah would be slightly later in date and would represent a further improvement of some of these innovations.

This new functional distribution matches also better with the Arabic medieval terminology used for baths' spaces in the standard medieval hammam: [40] *Maslah* (a sort of *apodyterium* with access to the latrines and to the proper bath rooms —that we could assimilate to the "audience hall"); *Bayt awwal* or *Wastani barrani* (an unheated room next to the warm ones, used as a cloakroom in wintertime); *Wastani Juwwani* (a warm room devoted to rubbing and depilation; and *Juwwani* or *Hararah* (the hot room close to the furnace and fitted with bathtubs).

The Transition Room [41]

As mentioned, this small room (2.40 x 3.48 m in plan) would have been used as a changing (cloak), tempering and waiting room, and not as a proper *frigidarium*, because the cold water pool or bathtub that should have existed here has disappeared.

It was covered with a barrel vault with its axis along the main length of the room (i.e. north-south). The first springing courses in both sides of the vault are of finely dressed stones, while the rest of the vault is built with thin roughly cut wedge-shaped limestone pieces, set likewise a brickwork vault. The springing line is not marked by any cornice moulding. This section of the vault was internally plastered. Traces of mural paintings can still be seen on this plaster. It is not clear if the walls, of fine limestone coursed masonry, were plastered and painted as well, although it is probable. Externally, the vault was plastered as well with an impervious lime mortar with crushed bricks/pottery that provided it with a characteristic pink color. The room is entered from the northwestern corner of the audience hall through a door 88 cm wide and 1.66 m high. Against the north wall was built a bench 80 cm wide and 40 cm high. It is possible that a small window would have been opened at the top of this end wall just under the crown of the vault to illuminate the room (other option would be some *oculi* piercing the vault —although it does not seem to be the case as they do not exist in the *tepidarium*). [42] Water was drained out through a hole in the West wall. A door (80 cm wide and 1.66 m high) in the East wall gives access to the *tepidarium*/*destrictarium*.

The *Tepidarium*/*Destrictarium*

It is an almost square room (3.31 x 3.14 m in plan) [43] covered with a cross vault (following the standard vaulting scheme of bathhouses in the Umayyad period). It has a recess in its eastern wall (1.55 m wide by 1.48 m deep) [44] covered with a barrel vault, that hosted most probably a bathtub (a drain at the floor level of the back wall connected to an outdoor channel running northward was used to empty it).

This warm room, hypothetically used as *unctuarium*/*destrictarium* (for anointing and rubbing) [45] was entered from the Transition Room through a door in its E wall, creating thus an angular circulation scheme. This "bent" scheme is apparently intended to prevent the formation of air streams that would disturb the different temperatures that should be achieved in each room of the bath. This circulation scheme is continued with the aligned access between the *tepidarium*/ *destrictarium* and the *caldarium*/ *sudatorium* facilitating the circulation of hot air from the furnace. Its floor (*suspensurae*) was resting in its central section on a grid of 5 x 5 *pilae* made of cylindrical bricks (22 cm in diameter and 5/6 cm thick [46]) built on a square brick (29 x 29 x 5 cm side) [47] intended as a base. On top of them were placed

40. This detail was pointed by Oleg Grabar when analyzing the function of the different rooms in the Bath-house at Qasr Al-Hayr al-Sharqi (see Grabar 1978).
41. As we have seen, we could consider it the antecedent of the medieval *Bayt awwal* or *Wastani barrani*.
42. At Qusayr ʿAmra the vaults of the audience hall, the lateral rooms flanking the throne alcove, and the *tepidarium* are pierced with *oculi* made with clay pipes.
43. With the wall linings that conceal the hot-air wall chambers the dimensions would be 2.95 x 3.08 m.
44. Taking into account the wall linings they would become 1.36 x 1.5 m respectively.
45. Thus could be seen as the antecedent of the medieval *Wastani Juwwani*.
46. Some of them present in their face an "L" (a gamma letter?) finger-incised in the clay before firing.
47. Some present diagonal lines (double and single ones) incised also with the fingers. Other bricks bear symbols resembling a "t" and a "b" combined in the same piece.

two additional square bricks, on which rested couples of leaning bricks creating a sort of mitre arches between the *pilae,* which were after covered by the *suspensurae* bricks (probably of bigger dimensions) which, laid in three layers, defined the floor. [48] In the northern and western perimeter of the room (corresponding to the areas of access and major circulation), it was resting on rectangular pilasters of brick built against the wall. The dimensions of the bricks used in these pilasters vary between 17 x 17 x 5 cm and 18 x 18 x 5.5 cm. [49] These pilasters were connected in its crown with brick-made semicircular arches. In the northern section they were aligned with the opening connecting the hypocausts of the *caldarium* and the *tepidarium* to allow the circulation of warm air without obstacles. The recess for the bathtub was heated as well by means of two channels built with bricks in its floor and the heated walls. A small channel connects the SE corner of the *caldarium* with the N wall of the recess of the *tepidarium*. It was apparently intended to drive hot water into this warm bathtub (although it could have also supplied extra hot air to the heated wall chamber of the recess).

The walls were also heated by means of a hot-air chamber created between the final wall-lining and the masonry wall itself, up to a height of 2.45 m above the floor level. At this height the walls are offset, overhanging approximately 12-13 cm so as to create that hot air chamber. In some areas it seems that hollow clay *tubuli* (box flues) may have been used, but none of them remain *in situ* except a sample in the *caldarium*. In other sections of the walls, it seems that these chambers might have been created using smaller hollow clay elements, or by the final marble slabs (maybe in combination with *tegulae mammatae*) due to the presence of the holes where the metal cramps to hold them would have been fixed. This last hypothesis is also based on the absence on the walls of the characteristic traces of shoot that usually leaves the imprint pattern of these *tubuli*.

In the overhanging section of the walls were built several grooves to host the cylindrical clay pipes that acted as chimneys for the hot air circulating in these wall chambers coming from the *hypocaustum*. The three ones than can be seen in the upper section of the southern wall vary between 13 and 15 cm in width. Inside these channels were placed ceramic pipes 10 cm in diameter, fixed with mortar that was finally flushed with the surface of the wall itself. There were another two of these flues in the northern wall, flanking the door towards the *caldarium*, which we have identified after the research conducted. These ones end at the upper edge of the chamber open to the sky that we will describe below. This northern wall including the door lintel and all the area above it had almost completely disappeared due to the stone looting (**fig. 12** and **15**).

In the upper part of this wall that separates the *tepidarium* from the *caldarium* are still visible elements suggesting the existence of a chamber open to the sky (**fig. 15**). This is confirmed by the plans and section drawn by Lh. Vincent [50] in 1926 and the pictures published by Creswell (1979 fig. 553 & 554). This had been completely obscured with the awkward reconstruction of the north section of the cross vault, projecting it until the arch of the *caldarium* pendentives (**fig. 12** and **15**). At the upper edge of this open chamber ended the latter two flues which are the final exit for the fumes and hot air circulating in the *hypocaustum* and later in the wall chambers. The only explanation for this chamber open to the sky is that it was intended to force the circulation of the hot air by means of the "*venturi*" effect [51] created by

48. A fragment of a brick 42.5 cm long and 6.5 cm thick (it is not possible to verify its original width) is still preserved in the remains of the floor (*suspensurae*) of the *caldarium*. If they were square they would have been slightly smaller than the standard Roman *sesquipedales* 44.4 cm square (1 ½ of a 29.6 cm foot). We could thus consider them *sesquipedales* of a 28 cm long foot.
49. Their sides show the imprint of mould, thus they would be square bricks of 18 x 18 x 5.5 or 17.5 x 17.5 x 5 cm made on purpose (i.e. slightly smaller than the standard Roman *bessales* [19.7 cm square]). Nonetheless, some of them might have belonged to bigger bricks, being cut to fit those dimensions: In the area between the *tepidarium* and the *caldarium* can still be seen bricks of 16 x 22 x 5 cm —although these seem to have been cut from bigger ones.
50. In the "AB" section drawn by Vincent, this chamber is clearly drawn, although no explanation of its function is given (see Creswell 1979, fig. 554).
51. Atomizers that disperse perfume or spray paint (airbrushes) and steam siphons, that use the kinetic energy from the airflow or the steam pressure, respectively, to create a partial vacuum, work on the same principle.

the wind blowing over it: The vacuum created in that chamber generates also a depression at the mouth of the flues, suctioning the air and fumes inside it, forcing thus the circulation of air and smoke in the whole system. [52]

The location of this device (together with the other flues) at the end of the hot air circuit would help guarantee and regulate the air circulation, that otherwise would make the whole system inoperative. Without this system to force the hot air and smoke circulation, the areas far away from the furnace would not be heated at all, the hot air and the smoke would try to find an exit not foreseen (entering the areas devoted to the bathers suffocating them), of preventing the whole system from functioning altogether.

The cross vault that covers the main space of the *tepidarium* was built, as in the case of the barrel vault of the Transition Room, with thin wedges of roughly-hewn limestone (**fig. 14**). Just the vault springers are built with four courses of well dressed stone, which help define the geometric shape of the rest of the vault (with arches slightly pointed) and provide the required inclination for these roughly-hewn "voussoirs". In this case, it is clear that the plaster and the mural paintings on it were running over both sections of the vault and the upper sections of the walls as well. This painted rendering would have stopped at the height where the marble slabs lining the walls ended. [53] The original north and south sections of the cross vault are still standing while the eastern and western ones collapsed and were awkwardly restored in 1974. [54]

The barrel vault above the recess had disappeared also due to the looting, being restored in 1974 with a wrong depressed profile and using solely crudely hewn limestone blocks. Its actual shape and the building technique used originally can only be elicited from the few remains *in situ* and the pictures available: Two complete courses [55] of finely dressed voussoirs from the northern springer of the vault (and the first one from the southern one) are still *in situ*. In the upper face of the western wall of the *tepidarium*, still stand the stones that were leaning against the extrados of this vault, offering the exact profile of its extrados (slightly pointed —with a distance between arch centres equal to1/10 of the vault span), and demonstrating that the face of the vault (the frontal arch opening to the *tepidarium*) was built with finely dressed voussoirs. In Creswell's photo #EA_CA_5402, it can be seen that the inner and back sections of this vault were nonetheless, built with hewn thin slabs of limestone in a brickwork fashion (similar to the barrel vault of the neighbouring transition/changing room —which has also well dressed voussoirs in the springers). Finally we have the parallel sample of the barrel vault over the furnace area, built with the same technique, the external edge of which is also faced with a well dressed masonry arch (see Creswell's photo # EA_CA_558). We can conclude thus, that this was also the solution chosen originally for this vault.

The *caldarium*/*sudatorium*

A door (also 80 cm wide) in the centre of the northern wall of the *tepidarium* gives access to the *caldarium*, a room originally covered with a dome on pendentives, and flanked by two lateral semi-circular recesses pierced with arched windows and covered with semi-domes.

52. The flues opened at the upper edge of the chamber to get benefit from the vacuum generated in it. Otherwise, if they had open to its lower/bottom area, they would have collected rainwater or even worse: they would have prevented the hot air and smoke from exiting the flues due to the pressure of the wind entering the chamber, neutralizing the desired effect.
53. A stucco cornice might have marked the horizontal limit between the marble and the upper painted areas.
54. As mentioned, in this restoration the northern section was continued connecting it with the southern arch of the pendentives of the *caldarium* dome, obscuring the original structures in between.
55. These courses run from the front till the back of the vault, overhanging the precedent courses to allow the creation of a heated wall chamber (like in the rest of the *tepidarium*). The existence of this heated wall chamber in the recess is confirmed as this offset of the upper courses also occurs at the back of the recess and the width of this offset is constant (12-15 cm) in all the walls.

Figure 14. Hammam al-Sarah. Internal view of the building before the restoration. Note the remains of the lateral semi-domed recesses, the pendentives, and the *tepidarium*'s cross vault in the background © DoA Archive.

The plan is quite complex and presents some dimensional irregularities [56] giving as a result an irregular setting for the dome: Actually the room has a cruciform plan with an apparent square base setting of 3.7 by 3.7 m, corresponding to the maximum length of its two arms. The problem is that the southern arm (the one towards the *tepidarium*) is longer (deeper) than the other three ones (49 cm deep, instead of the average 29 cm of the other three). As a result the dome base defined by the respective four arches spanning over these shallow "arms", is not a proper square, as expected, but a rectangle (2.78 x 2.98 m) oriented north-southwards. This fact is partly disguised by the overhanging upper sections of the walls (that coincide also with the springing lines of arches and vaults), which are offset outwards (like in the *tepidarium*) to allow the creation of hot air chambers in the walls of the room. [57] As a result, the width of the northern and southern arms (and the corresponding span of the overhanging arches that cover them —3.18 and 2.98 m respectively) is less than those of the eastern and western ones (2.90 m for the arm width and 2.78 m for the span of the overhanging arches respectively).

The pendentives' arches are slightly pointed, with a distance between centres of one tenth of the actual span. The semicircular recesses' walls present the same offset solution for the hot-air chambers. Accordingly, although their diameter at the base is 2.35 m, the arches above them have a span of

56. These are probably due to some metric confusion during the process of its laying-out, or some deliberate alterations to guarantee its stability (see below).
57. This offset is not even uniform, and varies between 10 cm in the central areas and 6 cm in the semicircular recesses.

2.23 m at the springing line. The related semi-domes have also a slightly pointed section, but their most remarkable characteristic is the disposition of their voussoirs with radial joints stemming out from the back of their base (**fig. 15** and **16**). This solution can be also seen at Khirbat al-Mafjar (marking another close link between these two Umayyad monuments). [58] They radiate from a saddle-like block placed atop the windows which rise above the springer line of the semi-domes. These odd windows are built with six voussoirs, not having thus a keystone although they have a clear pointed profile, [59] something unusual in the Umayyad architecture.

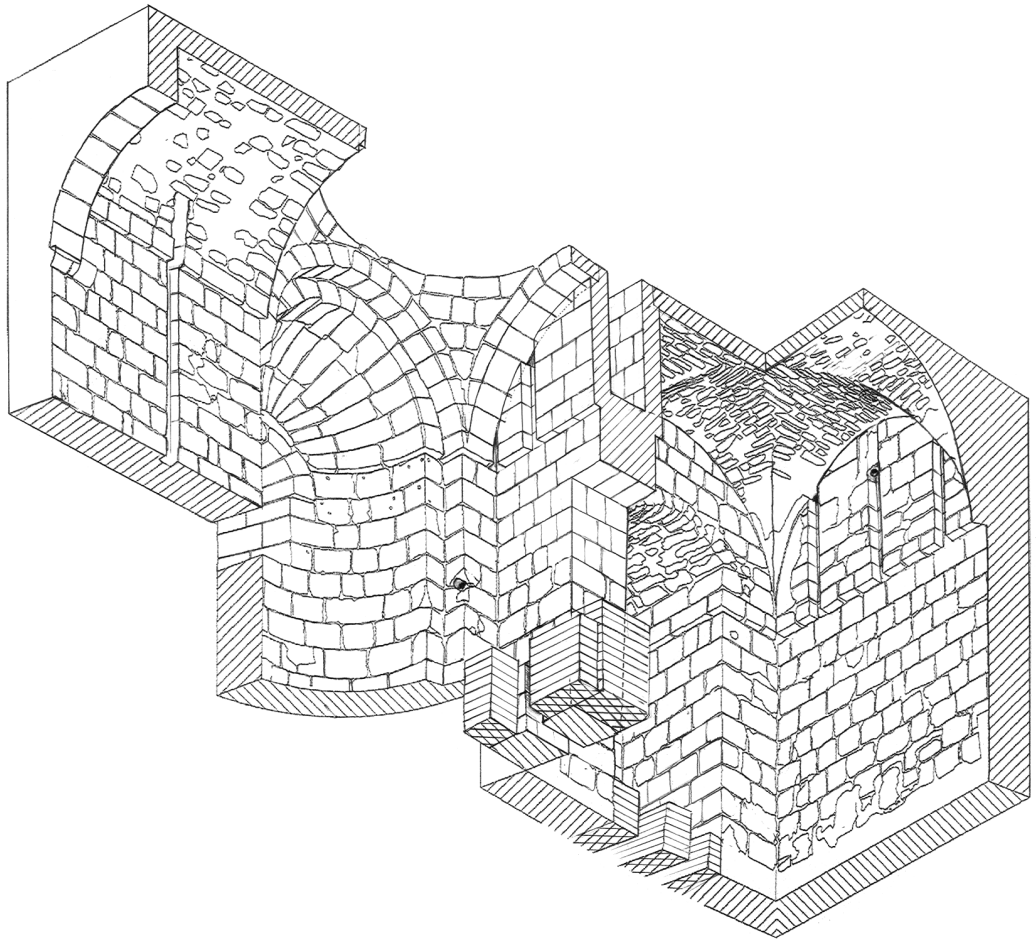

Figure 15. Hammam al-Sarah. Axonometric section. Present condition after de-restoration of the 1975 intervention and new restoration: Note the chamber open to the sky between the *tepidarium* and the *caldarium*. It was used to force the circulation of the smoke and hot air in the system, thanks to the suction created in the vertical flues coming from the *hypocaustum* that open at the top end of the chamber, due to the "*venturi*" effect (depression) created by the wind blowing above this chamber © I. Arce.

58. This solution was already developed as early as the 2nd cent. AD as a way of solving the mechanical problems when trying to build a semi-dome on a semi-circular niche with the "standard" concentric conical courses, which forces the plan of the niche to be ultra-semicircular to prevent the collapse of the keystone of the semi-dome. Samples can be seen at Jerash, Ledjah and Shahba. See also CHOISY 1883, fig. 80 & 84 and ARCE 2006.
59. They are 75 cm wide and 87 cm high (till the springing line of the arch) and 1.29 m (till its crown).

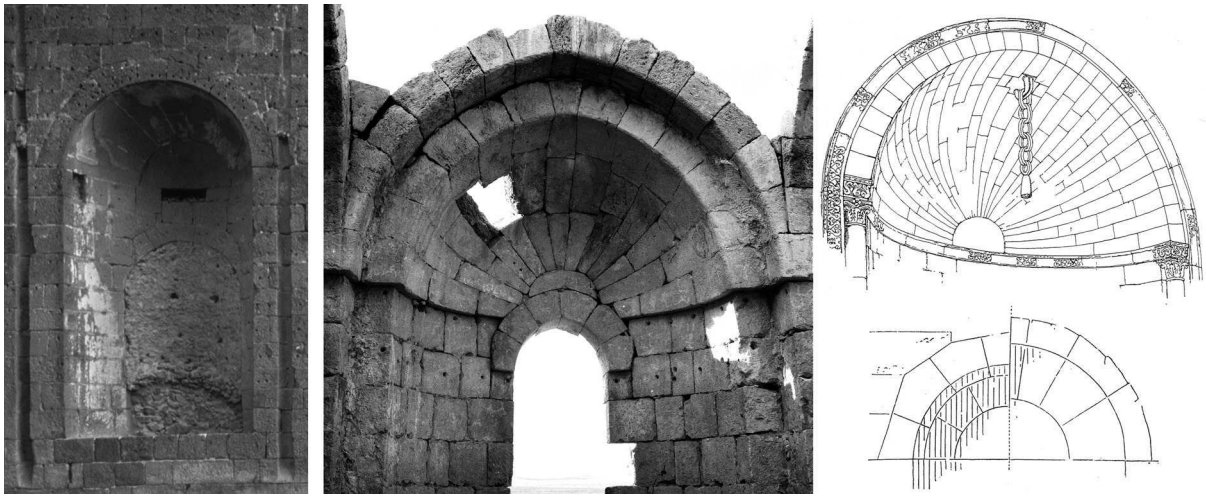

Figure. 16. Semi-domes with fan-like joints radiating from the back. Left: Shabha (Philippopolis) Roman Baths (© I. Arce); centre: Hammam al-Sarah (© DoA Archive); right top: Khirbat el-Mafjar (from Hamilton 1959); right below: Ledja and Jerash. From Choisy 1883.

On these pendentives was built an "*umbrella*" dome, i.e., a hemispherical dome with a circular base and a ribbed vault divided into individual webs, each of which has a baseline curved segmentally in plan and also curved in elevation that collapsed in the 1960's due to the looting. Apparently there were nineteen or twenty projecting ribs built with thin slabs of roughly cut stone. According to Creswell description, quoted by Bisheh [60], "un-hewn shale" was used, although in the pictures the thin slabs seem the same kind as those made of limestone, used in the vaults from the *tepidarium*. The dome was pierced at its base with some circular windows. It was resting without any structural cornice ring on the pendentives which were built of coursed and well dressed limestone and placed between the four perimeter arches we already described. The shape of the dome helped to conceal its irregularity determined by that of its base. The thrust generated by the dome was compensated and driven down by the two lateral semi-domes, by the mentioned deeper arch from its southern side (that would thus find a mechanical explanation for its apparently abnormal extra depth), and by the barrel vault spanning over the furnace in its northern side.

The floor (*suspensurae*) was supported over the *hypocaustum* by a grid of four by four *pilae* made of cylindrical bricks identical to those from the *tepidarium*. In the perimeter of the room the floor was resting on rectangular pilasters of brick (with bricks 17.5-18 cm square and 5.5-6 cm thick and others 22 x 18 x 6 cm) built against the wall. The lateral semi-circular recesses (intended most probably to host hot-water bathtubs, as the drains at the base of the walls would demonstrate) were heated by means of three channels built with bricks running under them. The *caldarium* walls were also heated with the hot air chambers created by box flues placed between the marble lining and the offset walls behind them. The shallower depth available in the semicircular recesses raises the question of how the hot-air chamber was created here. This could have been achieved by using specially designed *tubuli* shallower than the standard, or cylindrical pipes (like those used in the upper flues). [61] Some box flues (*tubuli*) were found in the main central space, showing that this area would have been lined with these box flues.

60. Bisheh 1990, p. 229.

61. This shallow dimension of the available space and the lack of traces of shoot on the walls with the characteristic pattern that shows the location of the box flues, lead us to make alternative hypothesis like in the case of the *tepidarium*: It could have been created by the marble slabs of the lining (maybe with the help of *tegulae mammatae*), although this hypothesis presents technical difficulties. Actually, the holes for the cramps used to fix the marble slabs are still clearly seen on the masonry of the recesses.

The lowermost ones presumably sat half on the bricks beneath the floor with their other half open to the *hypocaustum*. One long face would have been mortared to the stone wall and the other face coated in plaster or lined with marble to form the inner surface of the room. The only box flue found *in situ* is placed in the northwest corner. It is 25 cm high x 14 cm long x 12 cm wide x 0.7 cm thick. Irregular, oblong vents were cut into the short sides. The external faces were not scored. The hot air entered these chambers from the *hypocaustum* and was driven out by means of four vertical ducts built with clay pipes (10 cm external diam.) placed at the northernmost and southernmost corners of the room, stemming out from the corners of the wall offsets. Those at the northern corners had their exit ends at the base of the prismatic drum on which rests the dome (defined by the four arches from the pendentives), while those at the southern corners had their exit ends on top of that drum, beside the "suction chamber open to the sky", described *supra*, that exists between the *caldarium* and the *tepidarium*.

Similarly to what we suppose happened at Qusayr ʿAmra, vapour was most probably introduced into the *caldarium* from the neighbouring furnace through an opening in the wall that divided both spaces, [62] providing extra wet heat to the dry one provided by the *hypocaustum*.

The *praefurnium* and the service area

The northern section of the *caldarium* appears nowadays opened to an elongated vaulted space (3.12 m long by 2.58 m wide, covered with a slightly pointed barrel vault placed north-southwards). At its northern end there was the mouth of the furnace (*praefurnium*) that heated the air in the *hypocaustum*. The lower walls defining the duct of the *praefurnium* leading the hot air towards the *hypocaustum* were built with basalt stones (reused elements, some of them brought certainly from Qasr al-Hallabat —retrieved from pre-Umayyad structures). A wall must have existed separating the furnace area from the *caldarium*. Due to the great length of this space, the dividing wall between furnace and *caldarium* was possibly placed so as to create a recess with a bathtub in the northern side of the *caldarium*, [63] meanwhile at the other side of the wall a water tank would have existed, placed over the furnace to heat the water used in these bathtubs and to produce vapour that would be introduced in the *caldarium* (that accordingly we could interpret as a *sudatorium* with a mixed hot/humid heating system).

To facilitate the operation of the furnace, two big flues were built within the lateral walls of this vaulted chamber (plus a hole opened at the apex of the vault that can be seen in Vincent´s section). The furnace was operated from the service area room (6.20 by 3.95 m), which apparently was originally covered with a barrel vault. [64] Here fuel was stored and the person responsible for heating the bath (*fornaciarius*) might have had his lodge as well. A door in its eastern wall opened into the area where the hydraulic infrastructures were located (the person in charge of operating the furnace, might also have been the one in charge of their maintenance and control as well).

Phases of construction of the building

Several irregularities noticed in the building have led to put forward the hypothesis of a construction in two stages of the two main sections of the building, the proper bathing rooms block and the so-called audience hall block: Firstly, the irregularities in plan (see **fig. 13**) and in section of the northernmost aisle of the audience hall and its vault (narrower than the other two); Secondly, the lack of continuity that can be ascertained in the masonry work of the eastern and western façades in the transitional zones between both sections of the building (the technique changes and the horizontal joints of the courses are not aligned).

The discontinuity of the courses in the NW façade that can be clearly seen in the historical pictures (from Chicago University and Creswell Archive), corresponds to the vertical joint-line between the

62. Accordingly it could be seen as the antecedent of the *Juwwani* or *Hararah* in medieval hammams (see above, Charpentier 1995 and Grabar 1978).
63. This would explain the continuity of the offspring of its vault (2.48 m of span), and the possible existence of heated wall chambers here.
64. See Vincent's plans in Creswell 1979.

transition/changing room and the audience hall (**fig. 17**). It can be proven (following the principles of architectural stratigraphy, and according to the masonry building practices [65]), that the section of the audience hall abuts against and over the section of the bathing-rooms block and consequently, the latter had to be built before the audience hall. Apparently, an indentation was left in the southwest and southeast corners of the bathing-rooms block, to facilitate the connection of both sections of the building when it would have been completed.

Closer examination of these historical photographs and the analysis of the remaining walls and the building plan, demonstrate without doubt that, although the building would have been planned as a whole, the audience hall was built later than the block with the bathing-rooms (**fig. 13**). [66] This is particularly evident when we realize from these historical pictures that this construction in two stages involved also a change in the building techniques used. In the first stage, the walls were built with traditional *emplecton* masonry (i.e.: two faces of well squared masonry in regular courses [67] with an inner lime-mortar and rubble core) without any key element (headers) connecting both faces. In the second stage, corresponding to the audience hall, a different technique is found: Each six/eight courses of double standard masonry blocks (stretchers) is laid a course composed entirely of elongated blocks placed across the wall from face to face (headers) tying them. The first row can be seen at mid height, while the other one is eight courses above the first one, at the level corresponding to the springing line of the window arches (**fig. 17**). The first building technique is very common in the region during the Classical and Umayyad periods (the mosque at Hallabat is built with it), while the second one is found in the basalt architecture from the Hawran and at Qasr al-Hallabat (used in the pre-Umayyad building phase corresponding to the second half of the 6th cent. AD). The technique found at the Qasr, which served as a model for the Umayyad builders of the latest stage at Hammam al-Sarah, is slightly different, as the courses of headers are built with basalt stones to take advantage of the mechanical properties of this kind of stone, ideal to stand the flexion and tensile efforts borne by these elements. [68]

The change of techniques is also noticeable in the construction of their respective vaults (those from the bathing rooms were built with roughly hewn stones, similar in dimensions and shape to bricks, while those from the audience hall were built with accurately cut and well dressed voussoirs, or with lightweight lime concrete using volcanic tuff).

This construction in two stages would explain some other oddities identified in the structure: Firstly, the inscription in red paint found on the southern wall (that was covered by the marble panelling of this area close to the fountain basin [69]). Secondly the somehow awkward connection between both sections of the building that led to the result that the span of the vault of the audience hall over the northernmost bay (the closest to the bathing-rooms) is narrower than the other ones. Thirdly the presence just in this area of the concave-convex carved mouldings from the main door (which recall those from the second phase of the Hallabat Mosque). These two building stages could be thus related to the two steps also ascertained in the construction of the nearby and coeval Mosque at Qasr al-Hallabat, which will be the object of a detailed analysis in a forthcoming publication.

65. Due to the change of masonry work and the indented joint itself between them.
66. In this case, the wall seen in the photo from the bathing-rooms block corresponds to the transition/changing room.
67. The average height of the courses is 35 cm with maximum of 42 cm. Internally, the height of the overhanging projecting courses is just 24 cm, being laid horizontally, penetrating the core of the wall to guarantee the construction on top of them without compromising the stability of the wall. The height of the courses in the second stage does not vary apparently much from those of the first one.
68. See ARCE 2007a & 2007b.
69. The painted inscription was found above the pool, on a section of the wall that was covered with marble slabs fixed to the walls by means of cramps fixed on holes (still visible spotting the inscription). Why paint an inscription in an area that was intended to be covered? It just would make sense if we consider that the audience hall was built later than the bath-rooms and accordingly, the inscription would have been seen till the moment the construction of the section of the audience hall took place. Another hypothesis put forward, is that the inscription would have been done after the building was looted and the marble lining removed, but the epigraphic evidence (the calligraphy used), the oddity of this explanation, and the fact that the mortar covers apparently part of it, would not support this latter hypothesis, but the former one. Attempts to read it have been done by F. Zayadine and F. Imbert. But they have not been published yet.

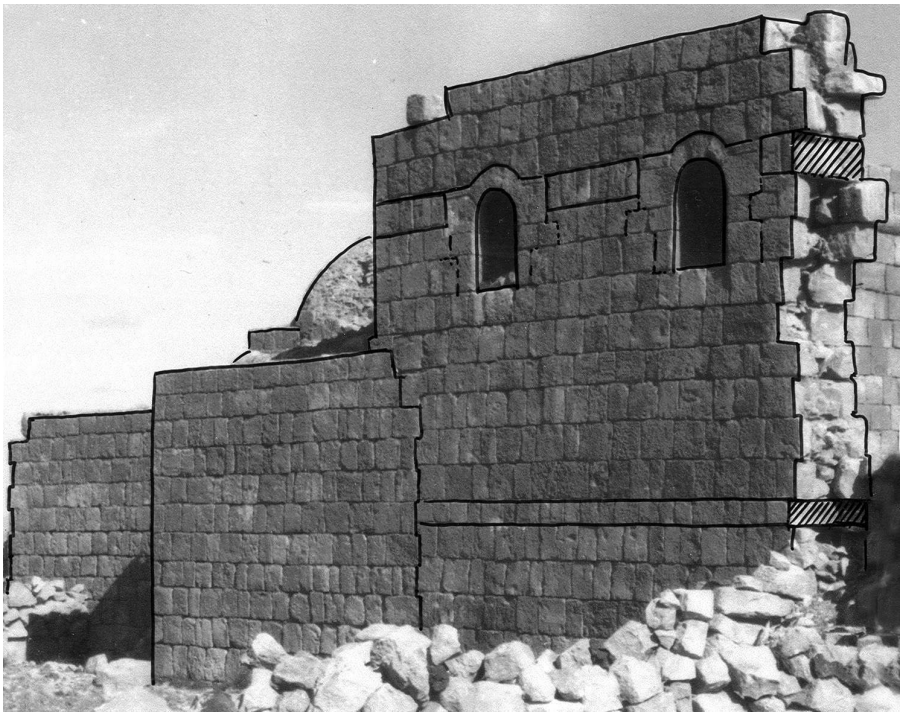

Figure. 17. Hammam al-Sarah. Construction phases: Detail of the joint between the *frigidarium* (to the left) and the audience hall (to the right) abutting on the former. Note the distinctive change of building technique in both stages
© Cropped photo from DoA Archives.

The hydraulic system

To the East of the building are the remains of the hydraulic infrastructure: The well, the water wheel (*sāqīya*) and the elevated water tank. They have been heavily looted, being left just the circular base of the lane of the water wheel (for the animal that revolves around a central base to raise the water by means of a gear and a system of pitchers), the shaft of the well (1.5 m of diameter built with carefully dressed limestone and at least 14 m deep) [70] and the base of the raised water tank. This elevated water tank served to provide the water lifted by the *sāqīya* with enough pressure to arrive by means of the pipe siphons to the bathtubs, the heating tank in the *praefurnium* area (as well as to the fountains). The tank was square in plan (side: 7.67 m externally and 6.03 m internally); its floor was raised 1.7 m from the land level and its walls were approximately 1.4 m high [71] (internally) and 80 cm thick. This gives a capacity for the tank of fifty cubic meters of water. It was internally plastered with an impervious lime plaster mixed with crushed bricks. Four exit holes with related grooves were built in the walls of the tank to host the clay pipes (10 cm in diameter and 38 cm long —of which 3 cm correspond to the narrower neck used as socket for interconnection) that drove the water to the bath-house, the fountains and the garden: Two in its western side, and another two in the northern and southern sides. The two channels coming from the northwestern corner of the tank drove water to the heater tank, [72] the one from its SW corner fed the fountain in the audience hall while the one coming from its southern side fed the

70. Bisheh 1989, fig. 1, reports a depth in 1974 of 16 m.
71. We extrapolated this dimension from the existing historic pictures.
72. A series of projecting stones in the eastern façade of the bathhouse close to the furnace area, and thought to have been indentations to link an enclosure wall never built, happened to be the support against which the twin pipes run up from the floor to feed the heater tank.

secondary deposit for the fountain and to water the garden. In the plan drawn by Vincent [73] can be seen a fragment of a wall dividing internally the water tank (it is located east-westwards 4.33 m to the South of the northernmost wall), that is clearly intended to provide water to both areas separately (the bigger one being devoted to the bath itself). Special mention deserve the clay pipes used at the base of the vertical drains of the tank: They have a closed end (the one corresponding to the socket-neck, which is no present —for which it has a length of just 35 cm), and a lateral opening near the base to connect the following horizontal tract of the clay pipe duct. The area to the west of the tank and surrounding the mouth of the well might have been covered with an arcaded structure (similar to that at ʿAmra) to host the gear and the related mechanism to drive the water raised by the *sāqīya* to the water tank.

The walled garden

Traces of the foundations of an oblong wall precinct (apparently it might be square in plan) can still be seen surrounding the complex (**fig. 9**). It is not clear if this perimeter wall just defined a square enclosure of 90 by 90 m approx., or if it included a bigger extension of land. The first stretch is located 23.5 m to the south of the water tank, and runs southwards for 90 m approximately. It turns then westwards, running for another 93 m, although in the middle it disappears for a while, perhaps marking the place where a sluice for entering the water running in the *wadi* during the rainy season would have been placed. It turns again northwards, running for another 61.50 m (although it seems that it continued further northwards outside the walled precinct of the archaeological site). At the northern end of the eastern stretch of the garden wall, the two parallel sections that compose the wall come apart, creating a sort of narrow and oblong wedge (a transversal stretch of wall closes its northern tip). This structure would be a secondary tank to provide the needed pressure to keep the water feeding the garden and its fountain (it was possibly used as drinking trough for animals as well). [74] The fourth line of clay pipes that stem out from the main elevated water tank, which drives the water up to this secondary tank, is still intact *in situ*. This section of clay pipes coming from the tank ends at this precise point with a "blind end" piece identical to that of the base of the tank ducts. Its lateral opening is pointing upwards indicating that the water was driven up to this oblong tank by means of a vertical stretch of pipes now disappeared.

Traces of a fountain basin and its feeding clay pipe have been identified in the central-eastern area of the walled precinct as part of the same scheme (**fig. 18**). The fountain was actually located in axis with the main door of the audience hall, 58.50 m southwards from it, and 22.40 m away from the eastern wall of the precinct. The fountain basin was carved in a monolithic piece of limestone (with an external diameter of 1.38 m and a wall 67 cm high, and an internal diameter of 1.06 m and an internal depth of 40 cm), now broken in pieces, some of them missing. [75] At the center of its base it is pierced with a hole of 12.50 cm in diameter to host the clay pipe that fed it. Almost all the clay-pipe tract that drove water to the fountain is still *in situ*: It runs 22.40 m eastwards until the eastern garden wall. It is clear that another line of water clay pipes must have connected this section with the tract bringing the water from the secondary oblong tank.

It is thus possible that the entire perimeter wall worked as an aqueduct, being used not only to feed the fountain but to water the garden or cultivated area enclosed by this perimeter wall. On the basis of the location of the site, on the bed of a *wadi* (from its subterranean water-table the water is obtained and raised by means of the *sāqīya*), an hypothesis regarding the functioning of this garden could be put forward: Apparently in wintertime, during the rainy season, the water driven by the *wadi* Rukban (that runs northwards just to the West of the garden, still flooding regularly the area) would have been retained

73. Creswell 1979, fig. 553.

74. Attached to the tank of the second *sāqīya* (the one beside the wadi) at Qusayr ʿAmra, there is a drinking trough for animals fed by the tank itself. Recently, during the restoration works carried out by the ISCR/DoA team, traces of another small drinking trough has been found attached to the eastern side of the water deposit of the main *sāqīya* at ʿAmra.

75. The remaining pieces have been now restored.

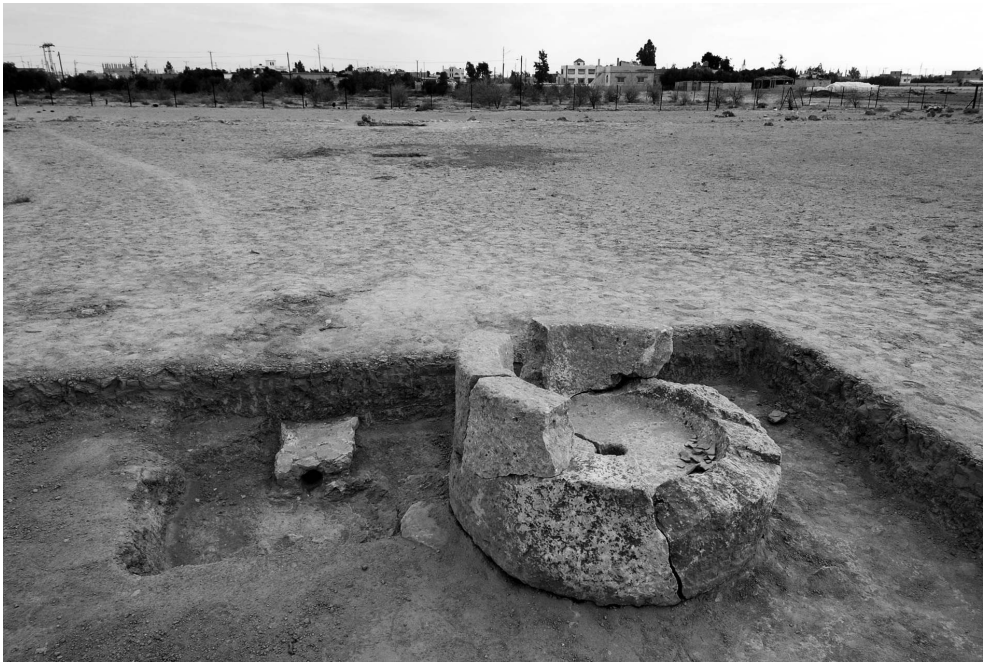

Figure 18. Hammam al-Sarah. Fountain basin from the walled garden. Note the clay-pipe channel beside it, still *in situ* © I. Arce.

by the perimeter wall (acting as a dam), thus allowing water to soak the lands of the garden; meanwhile, during the dry season, the *sāqīya* would have been operated to water the garden and not just to provide water to the bath.

The wedge-shaped wall present at Qusayr ʿAmra [76] is intended to divert the winter flash-floods protecting the building; while at Hammam al-Sarah the intention seems to collect the fertile silts brought by the flood to enrich a cultivated orchard or garden. At al-Sarah there is just one *sāqīya* to serve the garden and the baths (despite its bigger size), while at Qusayr ʿAmra there are two of them. This would indicate a more effective and efficient system for water harvesting and management in the case of al-Sarah. Still is not clear if the cultivated precinct was devoted just to the pleasure of the senses or if it might have had even a commercial scope as a part of the agricultural estate in nearby Hallabat.

Analysis. Social use and origins of the Umayyad baths in context

The construction of a palatine-thermal *architecture under the Umayyads*

It could be possible to extrapolate some of the conclusions reached in the comparative analysis carried out recently [77] between the settings and respective meanings of the palatine venues at Amman Citadel and Qasr al-Hallabat, to analyze and compare the significance and use of their two respective bath-houses. These two palatial compounds represent ideally the two-folded approach of the palatial building policy of the Umayyads, depending on the context where it was carried out: Among the Christian and Hellenized population of the great cities and villages of Syria, Arabia and Palestina (urbanites and peasants/villagers), or amidst the pastoralist inhabitants of the *Badiya* and the *limitrophe*, the border

76. Nonetheless traces of a perimeter wall and the presence of a second *sāqīya* indicates the presence of a sort of garden there as well.
77. See "The construction of a palatine architecture under the Umayyads" I & II (Arce 2009b & Arce 2009c).

hinterland defined by the *Limes*. [78] They offer two different approaches for two different attitudes of these respective populations ("target-groups" we might say), that represent and require consequently, different goals and different strategies: On the one hand, the Romanized Christian population (urbanites or peasants from the villages) with an hostile, reluctant and even defiant attitude, that must be convinced of the commanding role of the new Muslim rulers and the truth of their new faith, by means of propagandistic and coactive policies that are translated into the visual and effective take-over of the most significant places and buildings that represent this iconic shift of power. On the other one, groups of pastoralists or semi-pastoralists inhabitants of the steppe fringe bordering the desert, culturally closer to the new rulers, considered by the settled population as foreigners ("*Araboi Barbaroi*") [79] truly "outsiders" to their culture. [80] A social group that would show proclivity to establish a clientele relationship with the new rulers, [81] offering them political and military support (very much needed by the new, but not yet firmly established rulers). This is a special and very relevant relationship that requires an adequate theater to be performed: friendly and playful but impressive and dazzling at the same time. Places where pleasure and political business, enjoyment and clientele commitment can be played and performed simultaneously, as two sides of the same card, as two faces of the same game.

From this perspective, the palatine baths at Amman Citadel can be seen as a royal although functional setting, shared by the rulers, their courtiers and commoners. A complex with a mixed use also in functional terms as a place for relax, purification and social intercourse, but also as a place for audiences and palatine performances as the architectural setting indicates (with a commanding location for the ruler in an elevated stage above the attendants surrounding him, and under the symbolic umbrella of a royal semi-dome). The setting of Sarah is friendlier, yet still palatial and highly representative and impressive. Here the display of luxury and the will to surprise and amaze the visitor is combined with the aim to please, actually with the invitation to share these pleasures, offering the potential client to be co-opted in change of his political and military support. Persuasion is in this case the way for proselytism, the same strategy (and in many cases carried out at the same venues, although with different approach and means) that the Monophysite monks had carried out among these same pastoralist populations to spread their faith one century earlier. [82]

The evolution of the social role of baths and bathing from Antiquity throughout Umayyad period in Arabia and Palestine

The aim of this section is to analyse briefly the evolution of the social value of baths and bath-houses in the Levant, specifically in the provinces of Palestina and Arabia throughout Antiquity till the Umayyad period, trying to understand the influences that drove this evolution and how it was translated into new bathing practices and also into formal and spatial transformations of the bath-houses' typology.

78. See Shahid 2002.
79. In contrast with the "*Araboi Rhomaioi*", i.e. the Arabs that became Roman citizens after the Edict of Caracalla, among whom the Palmyreans and the Nabateans (see Shahid 2002).
80. Even if many of them were Christians, as most of them were Monophysite Christians, they were seen as "heretics" in the eyes of the "orthodox" Diophysite Byzantine Church. The contrasts between urbanites and *fellahins* on the one hand and pastoralist Bedouins on the other, have determined historically the social context of the region throughout the ages (see Arce 2012).
81. Similarly to that established earlier between the Tanukh, the Salihids, and the Ghassanids with Byzantium as *foederati* of the Empire for the defense of its borders against the Persian threat (Shahid 2002, Arce 2009a and Arce 2012).
82. A policy of religious proselytism that had also a political bias in its last stages, carried out by the zealous Monophysite Ghassanid phylarchs, that acted in many cases as patrons of those monks, trying to gain political strength in their pulse with the Byzantine authorities (besides to their religious defiant choice against the "orthodox" Dyophysite Church). A policy that set the path for the codes of conduct and the patterns of a clientelist relationship (and in many cases the venues themselves) with the inhabitants of the *Badiya* that the Umayyads would re-use in their benefit to achieve the effective political and religious overtake of the Levant and the lands beyond (see Arce 2009a and Arce 2012).

The importance of halls and thermal basilicas traced in the plans of Umayyad bath-houses [83] (see **fig. 23**) is a relevant issue that offers a clue of the social value in early Islamic society of bathing practices (as well as of its representative use as audience halls), that contrarily to the frequent moral rejection of Jews and Christians, especially during medieval period, would become a key element in Islamic cities and societies, as expression of an urban culture that they preserved from the end of Late Antiquity.

Late Hellenistic period baths

It is assumed that bath-houses were introduced in Palestine/Arabia during the Late Hellenistic period, being those built by Herodian and Hasmonean dynasties the better known and most representative ones of the way they were built and used in this period. The earliest of these baths were actually constructed in the palaces of the kings and the aristocracy of Judea and in urban settlements. But it is important to stress that these were private baths of the ruling elite, while public baths would be introduced much later. The rejection by Jews of public bathing because of moral and religious constrains, would explain the slow process of introduction of public baths in the region. Nonetheless, this strong religious influence would be determinant to the ritual value that bathing, ablutions and baptism would gain later in all the monotheistic faiths. Perhaps the most relevant fact is the frequent addition to these Hellenistic baths of *miqvaot* (Jewish ritual baths) as an auxiliary section of their spatial and functional arrangement, showing the ritual value (religious not "civic") related to bathing activity.

It has been suggested that the spread model was thus not the result merely of a Roman acculturation with the importation of "Italian" spatial models and techniques (as the use of local building techniques and the spatial adaptation to a specific activity sequence would demonstrate). Spatial analyses would unveil two cultural models of the Palestinian bathing regime. The first models, those from the Judean kings' palaces are different from those of contemporary Roman/Italian baths and militate against hypotheses of Roman/Italian diffusion. [84] Those from Herodian period would follow more closely the Roman models, although with some specific characteristics as well: It is noteworthy that the *caldarium* became the biggest space in most of these baths, as can be ascertained from the plans of these buildings. Furthermore, certain similarities in their spatial configuration might even allow speaking about a well established architectural type (*caldarium* with a semicircular recess placed axially facing another oblong one occupied usually by a tub, and occasionally lateral rectangular recesses). [85] This can be noticed at the baths of the upper and lower Herodion palaces and at that "independent" one from Masada (see **fig. 19**).

Nabataean baths

The excavations carried out in private Nabataean houses and complexes, demonstrate that the tradition of bathing was flourishing also in the Nabataean kingdom before their incorporation to the Roman Empire at the beginning of the 2nd cent. AD, due to Hellenistic influence. This influence is particularly evident in the private character of most of the Nabataean baths found up to now, similarly to the Hellenistic ones found in Palestine, still with a social value very different from that of bath-houses in Roman Culture. The Nabataeans built several of them, but always as private enterprises as part of rich

83. This is an attempt for a mere typological (not chronological) classification of the plans of the Umayyad bath-houses: Firstly the simplest samples with the axial arrangement of furnace, *caldarium, tepidarium* and *frigidarium*. Even in these cases the *apodyterium* already shows evidences of its use as an audience hall (Amman, Fudayn-Mafraq). Later can be traced the influence of the Late Antique model of bath with an ample hall, in some cases a proper thermal basilica (also suitable for its use as an audience hall), two *caldaria* and a transition changing room between them (it would be the case of ʿAmra, Sarraj, Qastal, ʿAnjar-East, Qasr al-Hayr al-Sharqi). Finally the case of Mafjar that represents an *unicum*, as the most complex example in spatial and technical terms.

84. See the full discussion in SMALL 1987.

85. In this case the Roman influence, could be ascertained in this arrangement of niches: It would resemble the location in the *caldarium* of the Roman baths, of a round basin with cold water (*labrum*) facing a quadrangular bathing place (*puelos*, *alveus*, *solium*, *calida piscina*) close to the *praefurnium*.

dwellings and *villae* (those from Deir Zantour and Wadi Musa in Petra, Khirbet Moyat ʿAwad are good samples of this kind of private baths) or built next to Nabataean temples (like at Wadi Ramm, Sahir al-Baqar, Sia or Khirbet edh-Dharih), [86] being used probably for religious ritual purposes. On the one hand, it seems as if bathing and baths would have gained a sort of "status symbol" character within the rich merchant Nabataean society, taking as a model of reference the Herodian /Hasmonean ones. But also the religious use that we can elicit in many cases from their location, (close to temples or religious precincts suggesting their use as part of purification rituals, etc) might be a clear influence of these same models and maybe, a further reason for rejection of their public use among the Nabataeans. In those found at the "eastern complex" in Wadi Ramm (**fig. 20**), [87] or the oldest sector (assumed by the excavators to belong to the 1st cent. BC) of the recently discovered ones near the Great Temple at Petra, [88] we can notice this Hellenistic influence also in some common typological elements: On the one hand the introduction of circular rooms (probably domed), although with not the same common use associated to them —at Petra it was apparently a *laconicum*, while at Ramm it might have been used as an alternative *frigidarium*. In the Hellenistic antecedents from the palaces at the Herodion, it was used as a *tepidarium* in the bath of the upper palace, or as a *laconicum* in the lower one. It is also found at the lower slope baths at Kypros where it was devoted to a *caldarium* (being the only room in this simple Hellenistic bath-house built on a *hypocaustum*). [89] At Petra we still can see how the *caldarium* is, in proportion, the biggest room of the bath and shares with the Hellenistic ones almost the same spatial configuration.

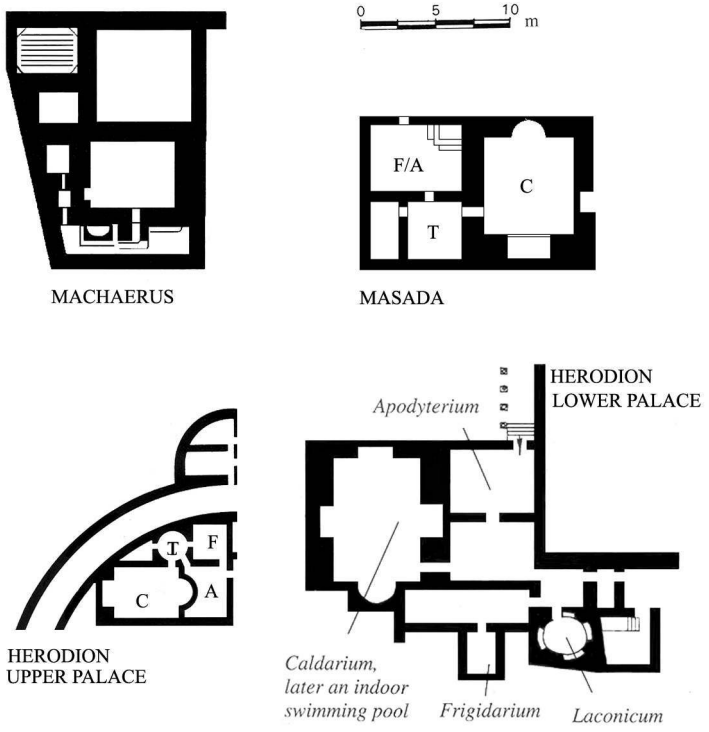

Figure. 19. Herodian bath-houses: Machaerus; Masada; Herodion, Upper palace; Herodion, Lower palace. After Corbo 1967, Netzer 1975a.

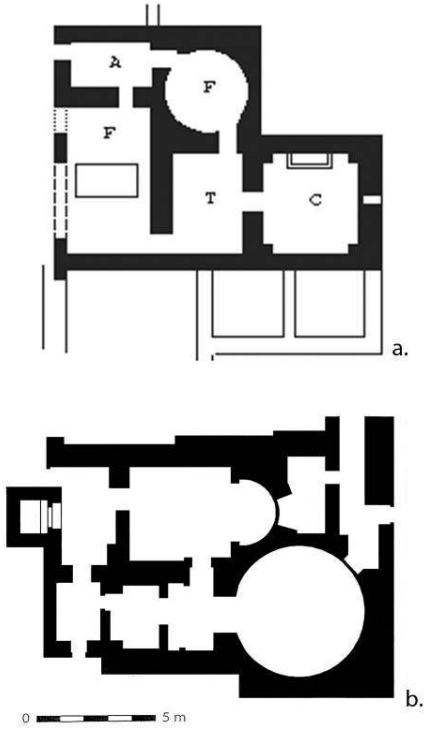

Figure 20. Nabatean bath-houses. **a**. Wadi Ramm Eastern complex bath; **b**. Petra Great Temple baths (pre-Roman/Nabatean phase). After Reeves 1996, Power 2007.

86. See C. Durand, in this volume.
87. Dudley & Reeves 1997.
88. Power 2007.
89. Small 1987 and Netzer 1975a.

Roman acculturation

Apparently, in Palestine the first public Roman baths would have been built after the Jewish wars, and spread in main cities as expression of the Romanization of the society and the reinforcement of the urban culture and civic values. In the less Hellenized regions (rural areas afar from the main cities), it would be with the arrival of the Roman Army and the establishment of military baths (within or beside the legionary camps) when this social use and value of bathing started to be spread in the society of the new Roman provinces of Palestina and Arabia.

It is important to pay attention to these different ways of introducing bathing culture in the region: Meanwhile in the major cities it was the local elite who introduced these practices from the new rulers (leaving in some cases a strong religious imprint and specific characteristics), in the peripheral areas, like those of the Limes, it would be the Roman army to spread bathing as a major social activity. An activity that would transmit the recreational and relaxing aspects of bath-houses and bathing that are at the base of its valence as social (and not merely religious) ritual.

According to this, apart from water availability, the location of military bath-houses might have been influenced by the location and its relation to an existing (or developing) civilian community, as a deliberate way to exert a cultural influence. It has been suggested that auxiliary bath-houses were placed outside their forts so that they could be used by civilians: "Baths were among the first manifestations of Roman culture with which the local inhabitants became acquainted… [Military] baths were normally… placed outside the forts and were thus open both to the soldiers and to the traders, craftsmen and other camp followers who settled in the vicinity". [90] Furthermore, on the basis of the study of the auxiliary *castella* in Britannia, Sommer (1984, p. 15) has suggested that the *castellum* bath-house was placed in the direction in which the Army wanted a local community (*vicus*) to develop. Reeves (1996, p. 47), notes that at Humayma the bath-house of the Roman fort was placed adjacent or in the midst of the pre-existing civilian community. [91] Thus local communities learnt about the pleasures and cultural significance of Roman baths, establishing new patterns of social relationship that would change deeply the existing ones opening the way for adoption of new cultural standards, in few words towards "Romanization".

Bathing in Roman culture (both civilian and military) is certainly one of the highest expressions of social relationship (if not the most outstanding), and bath-houses one of the major public services provided by Rome. Accordingly we could affirm that no Roman settlement of certain importance can be conceived without this public service. The social and public character of Roman tradition of bathing and bath-houses is perhaps the main difference with other traditions and cultures where beside the basic hygienic aim, it has a character linked closely to cultic or religious practices of purification (or are intended just as a private relaxing activity). This is particularly evident in the Legionary camps, where they provide garrisoned troops (and local clientele) with a venue for relaxation and social intercourse. Taking into account the best preserved one from Lejjun, we can realise how the *apodyterium* increases its size when compared with previous models, not only because of the bigger number of users, but also because it probably played an important role in the social intercourse of the legionary troops. In our opinion the reconstruction of the spaces of this bath should include a roof for the *apodyterium* that we attempt to represent in our own reconstruction (**fig. 21**).

Later this social role will be further developed and extended to the local population with the construction of public baths with ample *apodyteria* and *caldaria* as can be seen in the sumptuous baths from Shahba (Philippopolis), Hammat Gader, etc, and many other similar cases, closer if not identical to the "standard" civic Roman models (that were in many cases the result of an Imperial enterprise, like at Philippopolis). This will certainly mark the spread of bathing as a social and public activity.

90. Nielsen 1993, p. I.74.

91. It is possible that non military travelers had access to military bath-houses: Gichon believes that, in the nearby Negev, "*cursus publicus* and private travelers were particularly dependent upon the military installations for rest, shelter and protection, the more so since these posts controlled the water sources which had to serve the traveler as well" (Gichon 1974, p. 535). This fact would be related to the later transformation of Roman military forts into monasteries which would take over many of the philanthropic functions played by the former, with a clear intention of reinforcing the proselytism role they played in the spread of Christianism among the pastoralist population living in the region.

Late Antiquity

In Late Antiquity, and despite the sporadic animosity of the Christian Church against bath-houses and bathing, [92] the recognition of their social role and their importance for the civic culture of cities will be reaffirmed. Accordingly, in the Byzantine sources, the prosperity of a town is often exemplified by the maintenance of its baths:

> "In order that the splendid cities and towns may not fall into ruins through age, We assign a third part of the income from the farms belonging to the municipality to be used for the repair of public works and the heating of baths" (*Codex. Theod*. 15.1.32, trans. Cl. Pharr, 1952, p. 427).

Procopius states that at Mocesus in Cappadocia, Justinian "built many churches and hospices and public baths and all the other structures that are the mark of a prosperous city" (Procopius, *Aedificis*, 5.4.17 -trans. Downey, p. 335).

This can be ascertained from the Late Antique baths present in the region: Even if they do not have the size and grandeur of the great Imperial *Thermae*, they still keep the social and urban value of these structures for the Late Antique cities and society in general. [93] We might identify in these Late Antique baths the remains of a pagan Roman culture that thrives to survive against the animosity of the new Christian society towards the symbols of the pagan Roman society: An ultimate attempt of people to remain "citizens" and not subjects, members of a civic society and not of a religious community. [94] The samples from Sepphoris and Andarin/Androna (**fig. 22**) are very representative. [95] In both of them are attested two important transformations that will be adopted later by Umayyad baths: Firstly the reduced size of the heated bathing rooms in comparison with the "public gathering" areas (*apodyteria*, etc), showing the social importance of public baths for these urban societies (that at the same time cannot afford the expenses to heat the huge *caldaria* of earlier Imperial baths —like those from Shahba/Philippopolis, etc). Secondly, the spatial and functional configuration of the bathrooms (related to the above mentioned technical improvements that would be introduced into Umayyad baths) and the *apodyteria*, that according to the first point, start to adopt an spatial configuration of ample halls with axial semicircular recesses and niches that become the spatial dominant element, and the incorporation of pools, that also resembles spatially much the audience halls of the Umayyad baths, that certainly follow in many cases these pragmatic samples of adapting their typologies and technical improvements of bathing practices to a more constrained economic context. [96]

The social value of Umayyad baths

With the arrival of Islam everything related to the enhancement and promotion of urban culture will be preserved and developed almost as a State policy, preventing its loss. Accordingly, baths will be associated to the urban planning schemes carried out by the Umayyads. The case of Amman as we have seen stands as an ideal model: It incorporates the bath in the elaborated urban layout of the new

92. In this sense is illuminating the contradiction between the oriental monasticism that condemns openly the baths, and the attitude of the Church officers that tolerate it due to its popularity among the population of Syria and the Levant (see Yegul 1992, quoted in Charpentier 1995, p. 221-222 plus n. 12, regarding the interdiction by the monastic rule of St. Pacome and St. Jerome).
93. Charpentier 1995, p. 221, points out how in Syria and the Levant the true culture of bathing is represented by these small and medium-sized public baths.
94. Yegul 1992 points the disappearance of the *palestrae* from the plan of Eastern baths in Late Antiquity, something that would be related to the religious bigotry, that would limit the activities carried out in the baths to those hygienic and therapeutic, banning those merely recreational. The only sample of bath with palestra is that of Halabiye-Zenobia (see Lauffray 1991, "La palestre et les bains", p. 113-142).
95. Other samples from Orient that could be mentioned are those from Halabiye-Zenobia and Brad. This last one would represent the model more diffused in the entire region. See Charpentier 1995, p. 228.
96. Certainly Late Antiquity was a period of economic growth for the Levant, but nonetheless, local initiatives and the economies that supported them could not in any case rival with the luxury of Imperial ones.

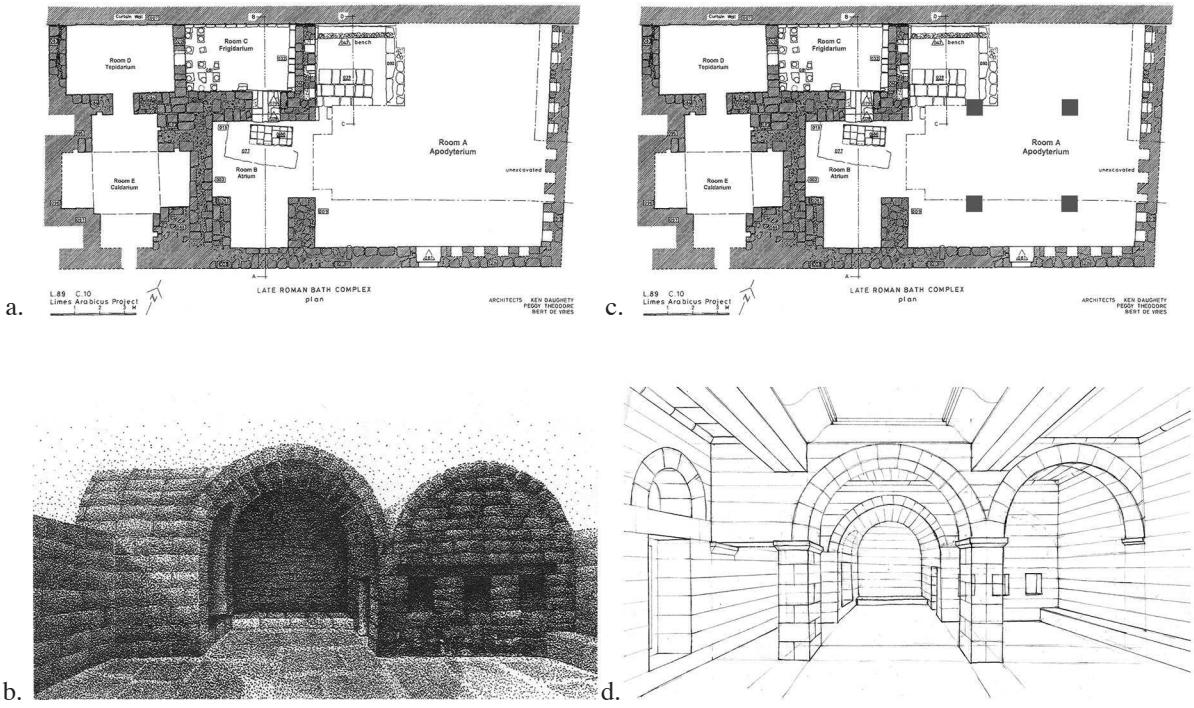

Figure 21. Lejjun (*Betthorus*). Legionary bath-house. **a**. Plan by K. Daughety, P. Theodore and B. De Vries, from Parker 2006, fig. 7.1; **b**. Reconstruction hypothesis by S. Taylor and M. Canniff, from Parker 2006, fig. 7.3; **c-d**. Reconstruction hypothesis by I. Arce.

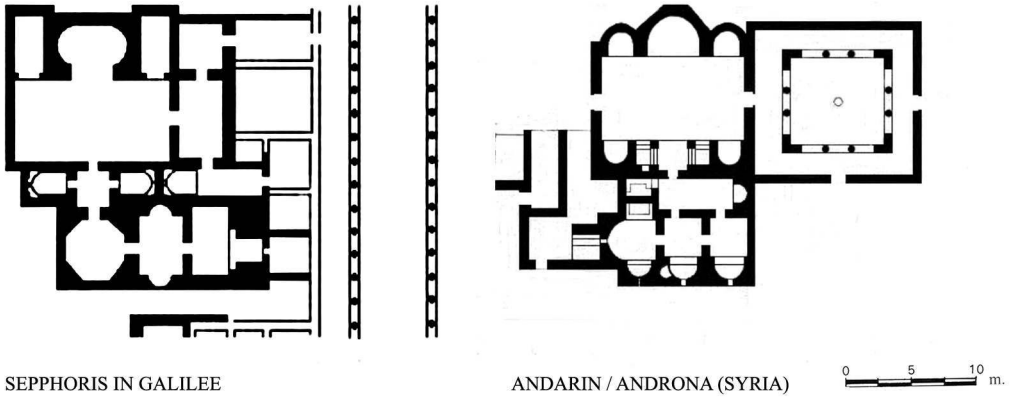

Figure 22. Late Antique bath-houses. a. Sepphoris in Galilee; b. Andarin/Androna (Syria). Redrawn from Mango 2002 and Strange 1992.

palatine city, assigning it an important role as link between palace and palatine medina. Other samples like ʿAnjar, or Qasr al-Hayr al-Sharqi support this assertion.

The recognition by the new Islamic elites, not only of the pleasures related to bathing, but also of its social role in urban communities, and even its use as ideal venue for political meetings and palatial receptions (see above), will lead to this supportive approach towards bath-houses. Only later, more moralistic approaches will tend to reconsider within Islamic societies the opinion on bathing and bath-houses: the two-folded approach that we could already recognize in Roman society, between the advantages and positive values (social and hygienic) that cement the social cohesion of a community, and those negative ones, that through moral relaxation and dissolute behaviour can dissolve that same society, can be also identified in the ambiguous Islamic attitude towards baths in later accounts.

Accordingly, baths can be a piece of celestial paradise on Earth and an essential element of social life and even religious rituals, or alternatively, the house of all sins and evils. [97]

The analysis of the plans of the Umayyad baths found up to now in the region (**fig. 23**) allow us to extrapolate the importance of this social value of bath-houses in Umayyad period. This will have its translation in the size of the areas devoted to these activities (like the *apodyteria* or the thermal basilicas and audience halls), in relation to the bathing areas themselves, something that finds a paradigmatic sample with the huge hall of Khirbat al-Mafjar. As mentioned before, this is not a chronological classification but merely a typological one. [98] We have also seen how these spatial and functional arrangements were also developed simultaneously to some technological improvements that were translated into key architectural typological transformations of the bathing areas which evolved towards more efficient and sophisticated models, and defined the transition from Roman *Thermae* to Medieval Hammams.

The simpler samples are those with an axial or linear disposition of the *praefurnium,* the *caldarium,* the *tepidarium* and the *frigidarium,* following the classical Roman model, which in some cases it does not have even a proper *apodyterium*. This would be the case of Qasr Ain es-Sil, a humble bath-house established in a pre-existing rural estate (it would be most probably a private enterprise). At Mshash, an *apodyterium* is placed in a parallel axis to that of the bathing rooms, establishing a model that is found also at Amman, Fudayn-Mafraq and Qasr al-Hayr al-Gharbi (already with elements that demonstrate the representative use as reception halls of their *apodyteria*, like domed stages and niches). The simplicity of all these cases could be related to the fact that these bath-houses were built in pre-existing structures re-used and transformed by the Umayyad elite [99] at their arrival to Bilad al-Sham.

The samples of Amman and Fudayn-Mafraq, despite their austere structure and absence of luxury decorations, present in their *apodyteria* the basic elements for hosting ceremonial receptions and audiences (like the semi-domed stages and recesses —*maharib)*. This is also evident in the case of Jabal Says that shares with the previous ones this simple layout (with an apsed hall), and the re-occupation of a site used previously. However the bath-house at Jabal Says presents already a more sophisticated technical infrastructure: the angular layout of the bathing rooms (see above). This same angular layout is also present in the western baths of ʿAnjar (although in this case we cannot assume the use of its *apodyterium* as an audience hall, as there is not present any feature or element commanding spatially the room). This might be explained by the existence of another bath nearby that might have hosted any official receptions, meanwhile this other one, placed to the West of the northern entrance of this newly built city, would have been devoted to the people entering the city (offering them this service before attending religious festivities, like congregational prayers on Fridays for instance).

Qusayr ʿAmra, Hammam al-Sarah and apparently Qastal (although the bathing rooms of the latter have not been excavated yet), would represent, on the one hand, the evidence of the strong influence of the Late Antique models of bath-houses and the related technical and typological contributions they introduced: An influence that can be traced in their layout, displaying more ample and magnificent halls even within these relatively small bath-houses, plus the related technical evolution (that also determines typological changes in plan as we have seen),with the introduction of the mixed system of wet-and-dry heating that would define the key change towards the mentioned transformation of the Classical *Thermae* into the medieval hammams. On the other hand, they would constitute a category of "suburban" establishments, devoted to act as theaters of the clientele policy of the Umayyad rulers towards the pastoralist tribes of the *Badiya* (the three of them are located in this area). For this reason (and as explained above —see above) they present this almost palatial setting, with luxury decoration,

97. As the behaviour of caliph Walid II in the case of Khirbat al-Mafjar (see Hamilton 1988). For the reflection of this two-folded appreciation on poetry, see also Audebert & Bakhouch 2014.
98. In many cases it is very difficult to attempt an absolute or even relative dating of these few buildings from the Umayyad period (in some cases different types could have been built at the same time depending on the circumstances). Besides we have to consider the short span of time of the Umayyad rule during which they were built and used. Accordingly, it is almost impossible to attempt a classification into proper chrono-typological groups.
99. The case of Mshash is not clear as it has not been properly excavated yet.

allegoric representations of power, that allow us to use terms like "throne alcove" (for the central apsed recesses), or "palatial venue".

Qasr al-Hayr al-Sharqi and the eastern bath-house from ʿAnjar, represent the transformation of the *apodyteria* into true basilical structures (following Late Antique models as well) that can accommodate a number of attendants much bigger than the small-sized bathing rooms (something that from a functional point of view would be somehow incompatible). Still they share another important characteristic related to this: both are part of newly created urban settlements (respectively a medina and a *misr* -pl: *amsar*), basic element of the Umayyad policy (*tamsir*) for the settlement of population and former troops in the territories of Bilad al-Sham.

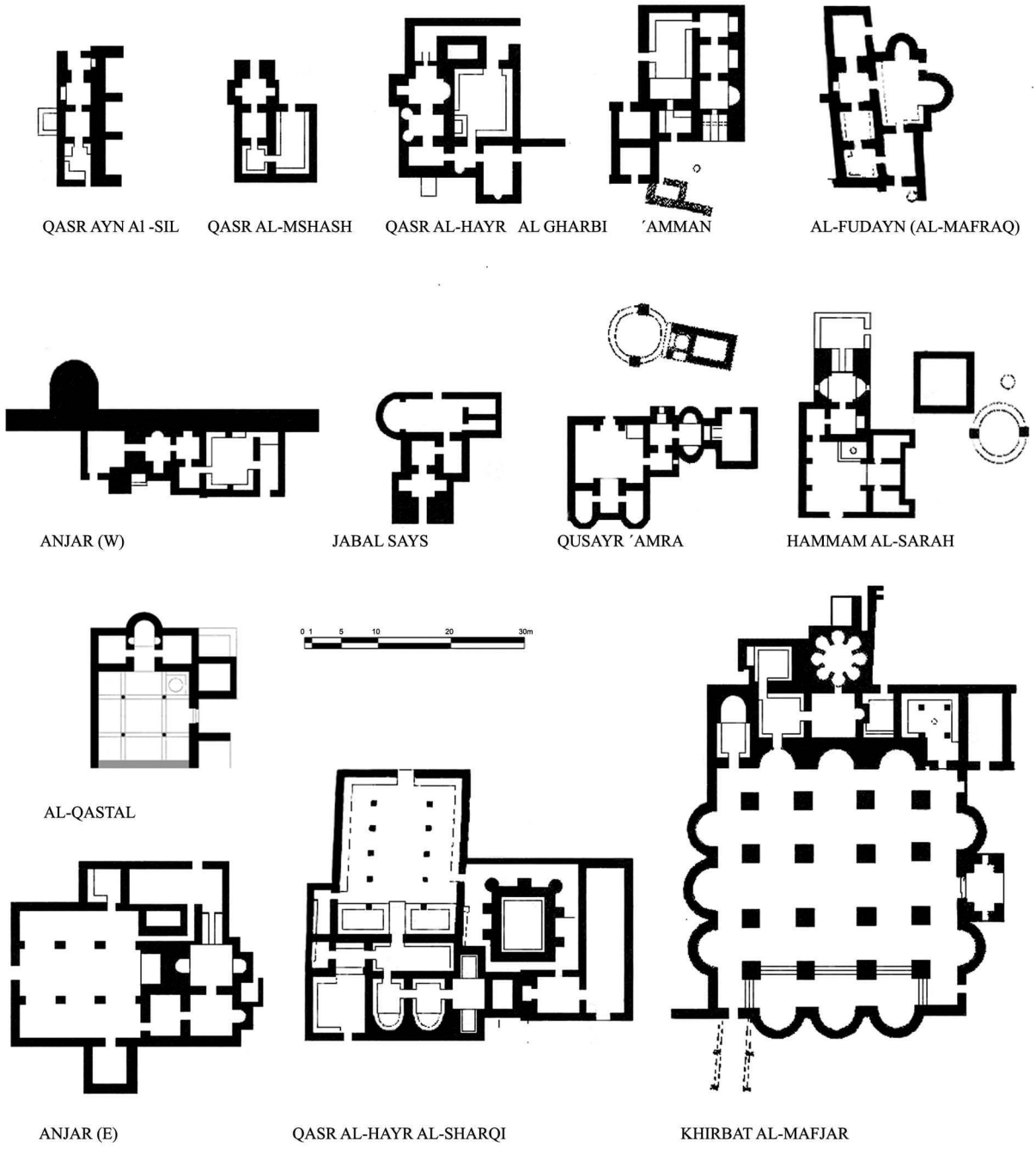

Figure 23. Umayyad bath-houses from the Levant.

The hypertrophic growth of the public areas and halls reaches its peak at Khirbat al-Mafjar where the disproportion between their size and that of the bathing installations (and consequently between the number of people that can be in the great hall and the one that can actually use simultaneously the bath) is enormous. [100] This case, due to its specific characteristics remains as a *unicum*.

Despite the still reduced number of identified and well studied Umayyad samples, the above mentioned groups (together with the category of urban baths reused or newly established in existing big cities and metropolis —that also await to be discovered and studied) would represent the major taxonomic categories for a tentative typological and functional classification of Umayyad bath-houses in the Levant. In any case this reduced group of baths shown present enough pieces of evidence to understand on the one hand, the increasing importance that bathing practices will have in the Islamic societies (as basic tool of social cohesion in urban societies), and on the other hand, the technologic and typologic changes that they introduce in the transition from Late Antique to Medieval models and practices.

100. This disproportionate size lead paradoxically, to the creation of a "private" reception hall (the so-called "*diwan*") within the great hall itself, where even the magnificence of the caliph and his voice would have been dwarfed by the immensity of the surrounding space.